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MODEL Airplane NEWS

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Great Planes Pitts

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MODEL Airplane NEWS

FEBRUARY 2003 VOLUME 131, NUMBER 2

ON THE COVER: *Great Planes' new 1/3-scale Pitts Special ARF is a delight to fly. Powered by a Fuji 50cc gas engine, the model is shown just before it touches down after a test flight. Nothing flies like a Pitts! (Photo by Walter Sidas.)*

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What's your favorite?

The diversity of this sport is incredible—not only in size and power systems but also in the relative ages and speeds of the airplanes we model. In this issue alone, we highlight WW I biplanes and the latest in turbine-powered, military jets; then we add a collective-pitch helicopter, a completely ready-built backyard flyer and a 21-foot scale bomber to the mix. With such a melting pot of models, it's easy to appreciate the remarkable range of products, planes and performances that makes our sport so great.

TWO WINGS ARE BETTER THAN ONE

If you like biplanes (and who doesn't?!), you won't want to miss our guide to ARF biplanes that starts on page 28. In this article, we highlight more than 65 ARF biplane and triplane models, from scale, gas-powered giants to electric park flyers. We've also added sidebars on setting biplanes' center of gravity (CG), wing incidence, flying tips and more to make your multi-wing experiences even more enjoyable.

OHIO JET SCRAMBLE

With more than 5,000 spectators and 200 model jets, the Heart of Ohio Jet Scramble deserves its place among the premier jet events in the U.S. Assistant editor Matt Boyd covered the latest meet and was impressed not only by the magnificent models and pilots who were present but also by how the host club successfully puts on a performance that wows the crowd and demonstrates to all viewers the true capabilities of RC jets. See what makes this 12th annual jet event stand out; turn to page 36.

GET MORE POWER!

It's interesting that the latest development in brushless-motor technology is actually reminiscent of WW I engine design! Like the antique Le Rhone rotary engine, in these "external rotor" motors, the can rotates along with the magnets around the windings to turn the propeller. This results in greater torque and allows a direct-drive brushless motor to swing a propeller that's larger than those used by conventional brushless motors. Check out contributor Bernard Cawley's review of this new—and less expensive!—brushless alternative on page 108.

For those who prefer the throaty, full-scale sound of 4-stroke power, John Reid explains how to adjust your engine valves for maximum power. This routine maintenance is easy to do and will keep your 4-stroke running as smoothly as it did after break-in.

GREAT RC REDESIGN CONTEST

We announced the first "Great RC Redesign Contest" for modified ARF models in the May 2002 issue, and since then, hundreds of great entries have poured in. Check out page 96 for the winners, and don't miss the Click Trip for photos of 25 honorable mentions. Some of you simply added pizzazz with decals or paint; some stripped and recovered airframes; and others reworked entire airframes to make them more scale; but all of your entries demonstrated your ingenuity and pursuit of diversity and individuality. Many thanks to all who entered. If you missed this contest or are working on additional ARF modifications, please remember to take a photo for our 2003 contest!

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WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

1-800-PILOTS

Great review of the Hangar 9 clipped-wing Taylorcraft, but I have one problem with the write-up: I wanted to order a scale pilot figure like the one Stan Kulesa used in his model, but you printed the wrong phone number for "Pilots by Diane." Do you have the correct number? [email]

JOHN

Sorry for the inconvenience, John; the correct number for Pilots by Diane is (450) 246-4543. Tell Sean and Diane we said "hi"! GY

LIGHTENING HOLE TOOL

Which tools do you use to make lightening holes in wing ribs, fuselage sheeting, etc.? I've tried hole saws, Forstner bits and punches, only to wind up with very uncraftsmanlike results. What's the proper technique? Thanks! [email]

DICK KILLMER

Dick, I use a length of 5/8-inch-diameter K&S Brass tube to make a hole-cutter. I glue a long dowel into one end for a handle, and then I sharpen the other end to form a cutting edge. I use a Dremel Moto-Tool to make the edge jagged and then bevel and sharpen it by scraping it with a hobby knife. Press the hole-cutter firmly onto the rib, give a few quick twists, and it cuts cleanly through the balsa. You can make the dowel handle as long as you want, and you can then cut all the way through a wing panel (through all the ribs one at a time) from the tip to the root so the holes all align with one another. You can also cut the holes in the ribs before you assemble the wing. If the cutter gets dull, simply sharpen it again with a hobby knife. The jagged edge acts like a saw and cuts much better than if you simply sharpened the edge without making it jagged. Hope this helps! GY

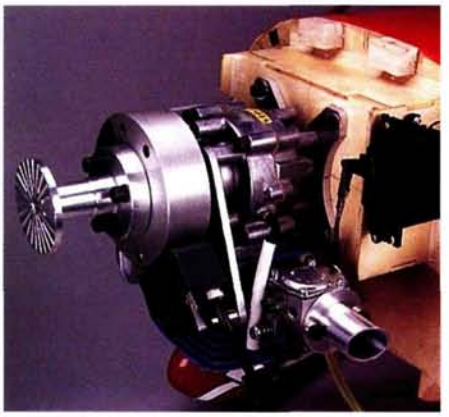
DIRECT THROTTLE CONNECTION

In a recent "Thinking Big" column, you showed a photo of the throttle-servo installation on your Great Planes Pitts Special. The servo was mounted on the engine box with a very neat-looking bracket. This little device will solve the same problem on my Hangar 9 Sukhoi. Who makes it? Many thanks, and keep thinking big! [email]

SHELDON CAMPBELL

Sheldon, this is an easy one! I simply used a Futaba aileron servo-mounting bracket. It was part of the accessory set that came with my

Futaba Super 8 radio. It's nothing more than a box with grommet-isolated mounting tabs molded to it. The servo slips into the box and is secured with grommets and servo screws. The box is then attached to the side of the plywood engine-extension box with a few more grommets and screws. I installed hardwood blocks inside the plywood box to support the attachment screws and then screwed the whole assembly into place. I used a Rocket City heavy-duty ball-link clevis (available from Nelson Hobby Specialties) and a length of threaded 4-40 music-wire pushrod. I soldered a metal clevis to one end and threaded the ball link to the other. So far, after more than two dozen flights, the throttle servo has performed properly; I have not experienced any radio interference with the servos' close proximity to the gasoline engine. GY



NIGHT BIRDS

I had a great time watching all the electric-powered models perform at the NEAT Fair in New York. I was amazed that electrics have developed to such an impressive level! I was also intrigued by the modelers' use of electric lights in their models for night flying. Holy cow—now we can fly 24-7! Could you please publish an article on this subject? I'm sure many readers would like to learn more; I certainly would. Thanks for a great magazine!

FREDERICK McLAUGHLIN,
Pottstown, PA

Night flying has certainly become popular—especially with the electric backyard-flyer crowd. Miniature electric light bulbs, LEDs and even chemical light sticks are all used to illuminate models. Some modelers even use transparent covering material and install the lights and wiring inside the model's structure. These models light up like neon billboards and are very easy to see—even on the darkest nights! We'll talk to some of our fly-by-night friends and see what we can do about publishing an article; thanks for the suggestion. Meanwhile, check out the Click Trip. GY

click trip BACKYARDFLYER.COM TAKE THE CLICK TRIP TO WATCH NIGHT FLYERS IN ACTION.

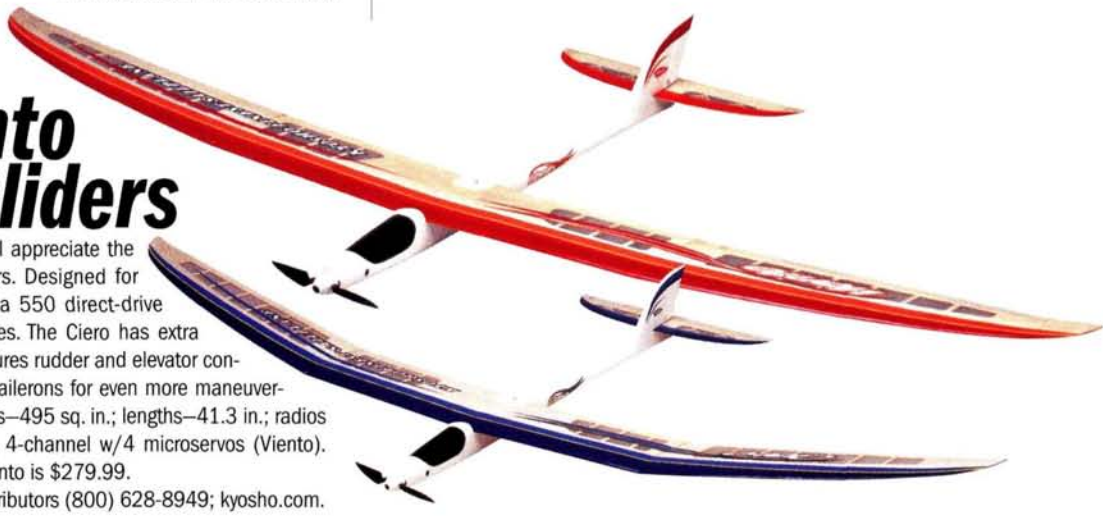
NEW PRODUCTS hit the model airplane market all the time, so here's the inside source for what's hot and where you can get it. Every issue, we sift through product announcements, show reports, rumors and prototypes to let you in on the best and the latest. Remember, you saw it here first!

AIR SCOOP

by the Model Airplane News *crew*

KYOSHO

Ciero & Viento EP Gliders



Serious glider competitors and sport pilots will appreciate the grace and style of these ARF 2-meter gliders. Designed for exceptional performance, each comes with a 550 direct-drive motor, folding prop and all necessary linkages. The Ciero has extra dihedral in its wing for added stability and features rudder and elevator control, while the Viento has rudder, elevator and ailerons for even more maneuverability. Specs: wingspans—78.75 in.; wing areas—495 sq. in.; lengths—41.3 in.; radios required—3-channel w/2 microservos (Ciero), 4-channel w/4 microservos (Viento). The Ciero has a retail price of $249.99; the Viento is $279.99.
Kyosho; distributed by Great Planes Model Distributors (800) 628-8949; kyosho.com.

SUPERKRAFT

TEXAS HURRICANE

"We have a warm front coming in from the south, and a Texas Hurricane that's bigger than any we've seen before!" Like the other models in the SuperKraft lineup, this 78-inch-span ARF features all-balsa construction, Oracover covering and painted fiberglass cowl and wheel pants. It also comes with an aluminum engine mount and landing gear. With 1,148 square inches of wing area to support its 11- to 14-pound ready-to-fly weight, this plane should have no trouble tearing up the skies! A 4-channel radio with six servos and a 2.1 to 3.2 gas engine are recommended. List price is $437.77.
SuperKraft; distributed by Kangke USA (631) 274-3058; kangkeusa.com.

GREAT PLANES ELECTRIFLY

Triton DC Peak Charger

Looking for the ultimate in charger technology? The Triton may be your answer! This peak-detect charger, discharger and cycler is easy to program and can be used with 1- to 24-cell Ni-Cd and NiMH packs, 1- to 4-cell lithium-ion packs and 6, 12 and 24V lead-acid batteries. It can also store 10 memories for different battery configurations for instant, easy recall and setup, has adjustable current rates, overload and reverse-polarity protection and can recall data for up to 10 full cycles. A battery-temperature monitor is optional. The Triton has a list price of $139.99.
ElectriFly; distributed by Great Planes Model Distributors (800) 628-8949; electrifly.com.

This ARF beauty is loaded with scale details such as factory-installed flaps, painted fiberglass cowl and wheel pants, wing-strut fairings, a detailed interior and corrugated aileron and elevator-control surfaces. Like other Hangar 9 ARF models, it's built of high-quality balsa and plywood and is covered in UltraCote; it also comes with all necessary hardware. Specs: wingspan—94.75 in.; length—76.75 in.; weight—16.5 to 18 lb.; wing area—1,246 sq. in.; engine recommended—1.48 2-stroke or 1.50 4-stroke. The Skylane has a retail price of $799.99.
Hangar 9; distributed by Horizon Hobby Inc. (217) 355-9511; horizonhobby.com.

HANGAR 9

Cessna 182 Skylane

GREAT PLANES PATRIOT 40 IT'S BACK!

If you missed your chance to get a Patriot 40 the first time they were available (or you'd like to add another to your hangar), you're in luck! This limited-edition release of a favorite model offers jet-like performance with the ease and simplicity of a front-mounted engine and prop. The kit features interlocking parts and has internally mounted linkages, pushrods and control horns for great aerodynamics and a sleek profile. Specs: wingspan—47 in.; wing area—524 sq. in.; weight—5.5 to 6 lb.; length—56 in.; engine required—.40 to .46 2-stroke. The Patriot costs $149.99.
Great Planes Model Distributors (800) 628-8949; greatplanes.com.

RC SHOWCASE

ZDZ 40B Sportsman

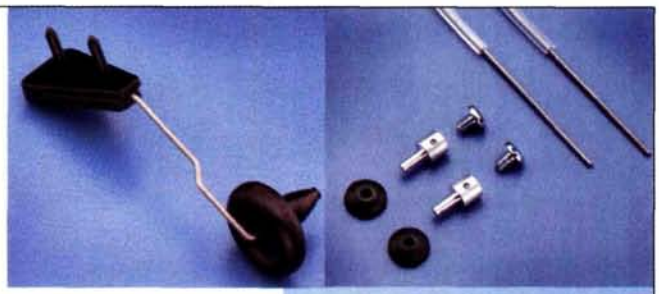
If you've wanted to step up to gas power but were unsure of the equipment and maintenance involved, your prayers have been answered. Designed especially for first-time gasoline-engine users, this 40cc powerplant is easy to use and maintain and comes with everything you'll need to install it in a model plane except a fuel tank. It's based on components used in the popular ZDZ 40 RV-L, with a reed valve instead of a rotary-disc intake valve. The engine comes with a Bisson side-mounted inverted muffler, 1400mAh Sanyo 4.8V Ni-Cd pack, auto-advancing ignition system, a heavy-duty ignition switch with a built-in charger port, an overnight battery charger, prop drill jig and a 20x8 Bambula Beech Power Prop. Flying weight with the supplied accessories is 3.875 pounds. The engine retails for $430.
RC Showcase (301) 374-2197; rcshowcase.com.

AMERICAN PIONEERS HOBBIES

Sukhoi Su-31

Looking for a high-performance aerobat with low building time and a low price tag? Then check out this ¼-scale beauty. The ARF aerobat features balsa and plywood construction and Oracover covering, and it comes with installed pushrods, hinged control surfaces, a painted pilot figure and clear canopy and a painted fiberglass cowl and wheel pants. Specs: wingspan—70 in.; weight—9 lb.; engine recommended—1.20 to 1.60 2-stroke or 1.60 to 1.80 4-stroke. At an introductory price of only $299, it's sure to please.
American Pioneers Hobbies (413) 781-2036.

Already a favorite among the micro-flight crowd for its small hardware, Du-Bro has introduced even more small connectors and parts that are ideal for indoor and backyard flyers. The low-weight, high-quality items include an injection-molded, micro-bellcrank system with mounting hardware; a micro-aileron system with two EZ links, two 1/32-inch L-bend pushrods and two plastic bearings; a micro-tailwheel bracket and micro-wheel retainer; a micro tailskid; and 3/8- and 1/2-inch-diameter tailwheels.
Du-Bro (800) 848-9411; dubro.com.



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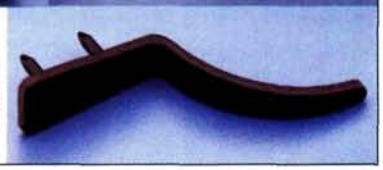
Micro Hardware



KYOSHO

EP Concept SR

with see-saw head

A longtime favorite for e-power helicopter enthusiasts, the popular EP Concept SR is available again—but only for a limited time. This high-performance helicopter also boasts some upgrades, including a see-saw head, S-Power motor, fiber-reinforced frame, longer mast, foam-core blades and reinforced blade grips. The main rotor blades and stabilizer travel on the same plane for maximum stability; a one-way clutch is supplied for autorotation. Specs: main rotor—53.2 in.; length—32.3 in.; height—9.9 in.; weight—3.4 lb.; radio required—6+ channel heli radio with four servos, ESC and mini gyro. This special release retails for $479.99.

Kyosho; distributed by Great Planes Model Distributors (800) 628-8949; kyosho.com.

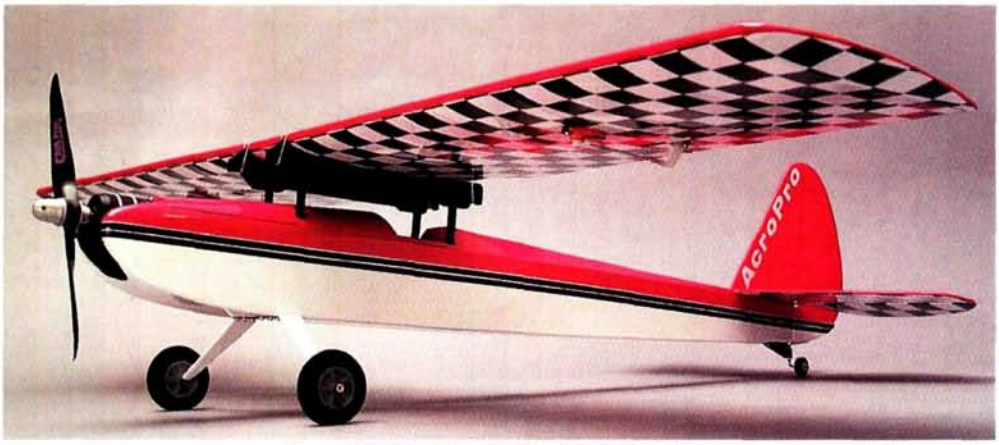
ROBART

Hinges

by the hundred!

Master modelers swear by Robart's easy-to-install, heavy-duty Hinge Point hinges, and now they're available in bulk! Item no. 311B includes 100, 1/8-inch steel-pin Hinge Point hinges for $26.95, and item no. 212B offers 100 3/16-inch steel-pin Super Hinge Point hinges for $32.95. Can't use 100 hinges? Get some modeling buddies to go in with you, and share the wealth!

Robart Mfg. Inc. (630) 584-7616; robart.com.

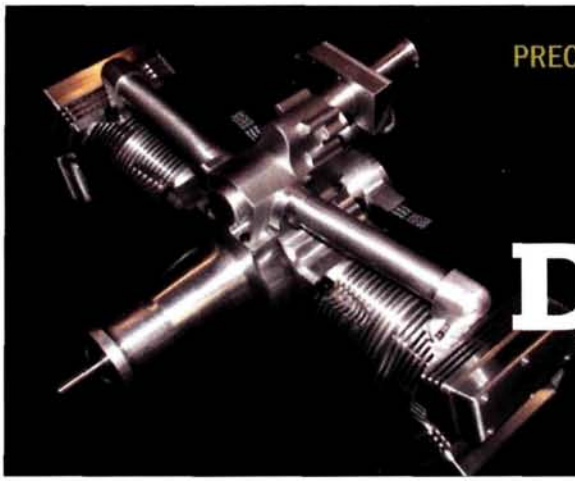


ACROPRO

SR BATTERIES

This nimble aerobat can handle any maneuver you want to try, including horizontal and vertical 8s! The aileron-equipped model features a fully symmetrical, 45-inch-span wing with 350 square inches of area and a wing loading of 15.6 ounces per square foot. With the recommended direct-drive Phasor 15/4 motor and SR 7-cell, 1300mAh Max battery pack, the AcroPro can do aerobatics for six to seven minutes or can provide 12 minutes of sport flying. The introductory kit price is $119.95; special power and radio packages are available separately.

SR Batteries Inc. (631) 286-0079; srbatteries.com.



PRECISION PLUS ENGINEERING

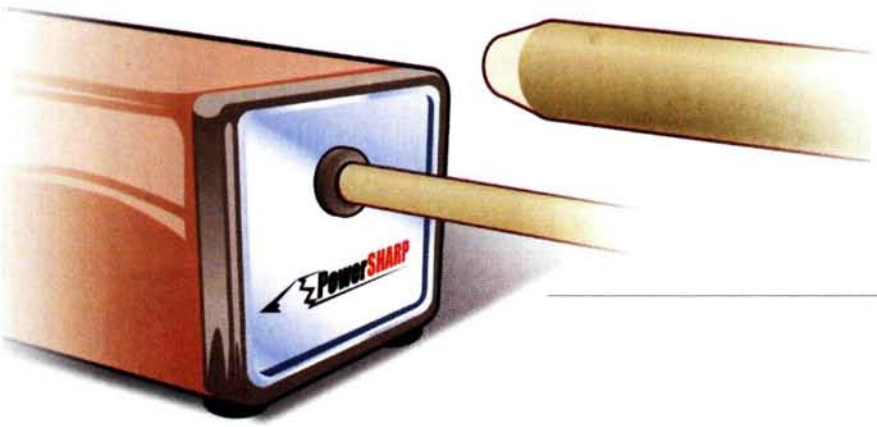
79cc DOHC Twin

Racing enthusiasts, take note: this new belt-driven, dual-overhead cam engine is about to hit the scene! Designed specifically for the giant-scale-racing Formula 1 class, the power-plant features four valves in each cylinder, a boxster-type, semi-open-combustion chamber, supercharged induction and mist-type lubrication. Fuel injection is optional. Specs: bore—1.55 in.; stroke—1.29 in.; weight—5 lb., 8 oz. Price will be between $2,500 and $3,000, depending on the size of the production run.

Precision Plus Engineering (541) 347-7123.

TIPS & TRICKS

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.



A SHARP IDEA

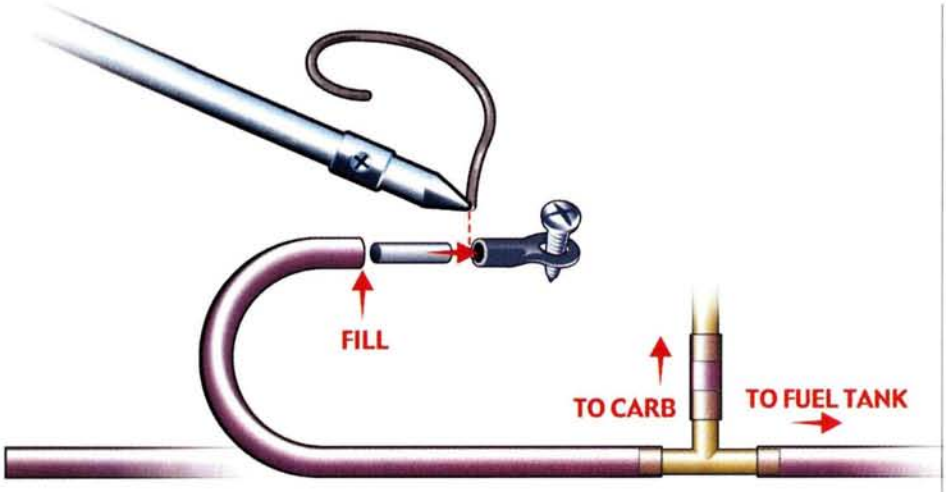
Most model airplanes use dowels to secure the leading edge of the wing to the fuselage and, for easy installation, the nose of the dowel should be tapered. Many modelers use sandpaper and a sanding block to make the taper. Next time, try this: take the dowel and insert it into an electric or mechanical pencil sharpener. After a few seconds in the sharpener, the dowel will have a crisp, clean, even taper.

Joshua Kolb, Spring Hill, FL

FILL 'ER UP

To fill up the tank on gas-powered models, the use of a "T" fitting in the supply line is very common. After the tank has been filled, the fill line is plugged and left to dangle in the breeze. This is pretty unsightly, and it could be dangerous if the plug accidentally fell out. A better way is to solder a short piece of wire to an electrical solder lug and attach the lug to a convenient spot. Then simply pull the fill line off the plug, fill the tank and reinstall the line on the plug. You'll never lose another plug.

Emile Alline, Lumberton, MS



AFTER THE FACT

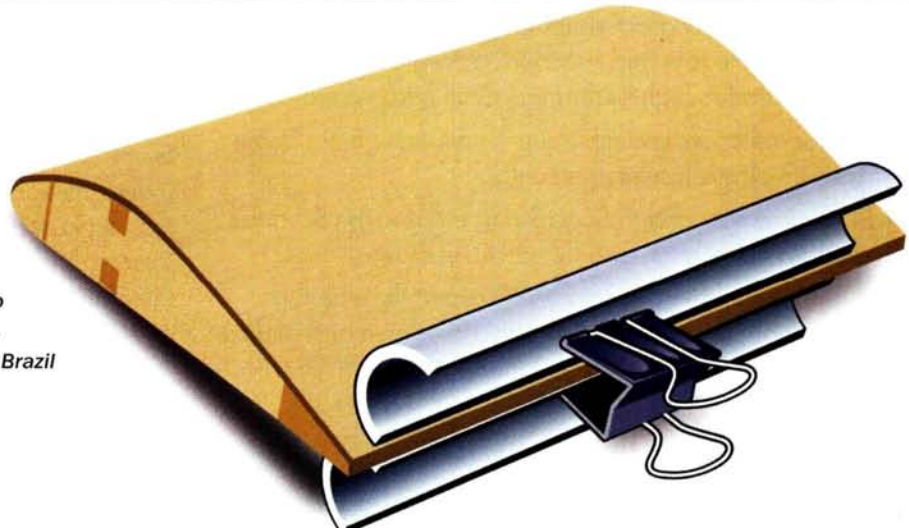
How many times have you forgotten to put a piece of heat-shrink tubing on a wire before you soldered it to a connector or another piece of wire? To solve the problem, you probably un-did the solder joint, slipped on the tubing and re-soldered the joint. Here's a way around that: cut the tubing to length, slit it lengthwise and place it on the wire. Carefully apply thin CA to the slit and allow it to thoroughly cure. Slide the tube into position and shrink as you normally would.

Robert Reichard, Portland, OR

LET'S GET TOGETHER

To join trailing sheeting, most modelers use T-pins—not the best way to get a true trailing edge. Instead, take a length of PVC pipe and cut it lengthwise. After you position the sheeting with your preferred glue, lay each half of the pipe on each side of the trailing edge and hold the pipes in place with large binder clips. Using the pipe helps to keep the trailing edge true without any dents or dings.

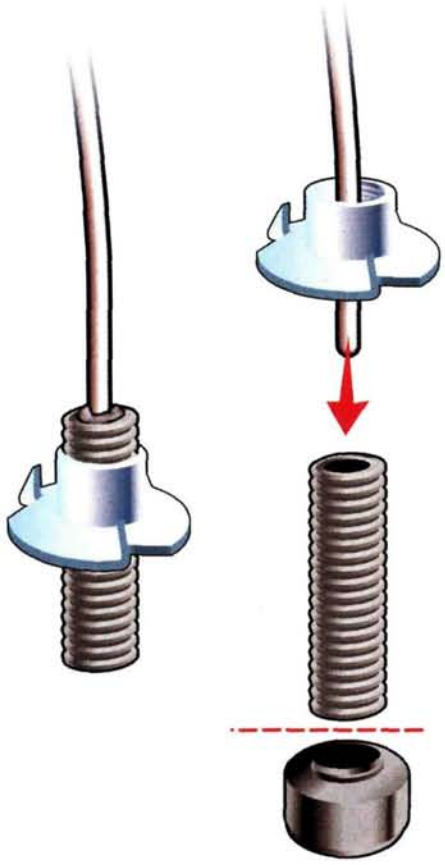
Fabio Nobre Gil, Piracicaba, Brazil



PLEASE BE SEATED

Blind nuts that have been installed on firewalls are usually inaccessible. Here's a clever, easy-to-make tool that can seat a blind nut and works like a charm. Take a bolt of the appropriate size and cut off the head. Drill a 1/64-inch-diameter hole in the end of the bolt and solder a pull/pull cable into it. Thread a blind nut on the bolt and feed the cable through the hole in the firewall. Now simply thread and tighten a wing nut on the exposed bolt, and the blind nut will seat. Don't forget to add some glue to the flange of the blind nut.

Vern Coop, Joliet, IL



HANGING AROUND

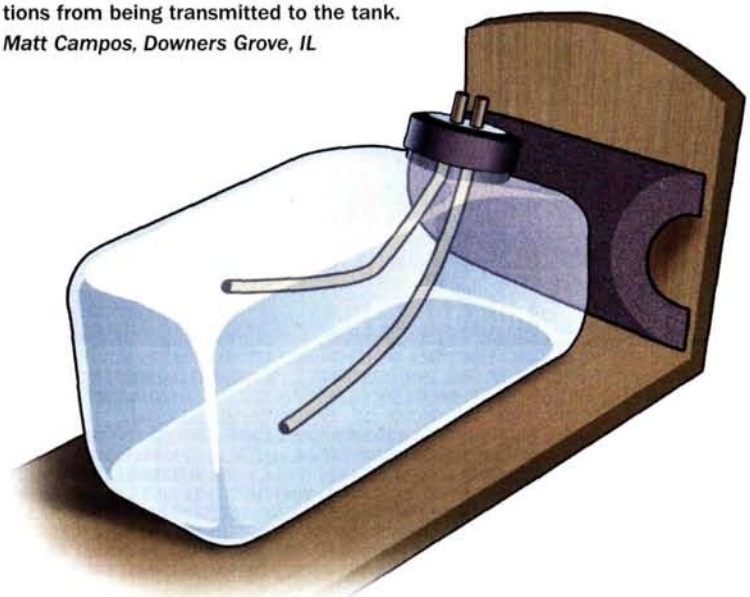
We all know the kind of tangled mess wall chargers can become if not kept orderly. Go to your local home improvement store and buy a few of the inserts that go into duplex outlet boxes. Attach them to a cabinet door or other out-of-the-way place, and voilà! It's an easy, tangle-free way to hang your chargers.

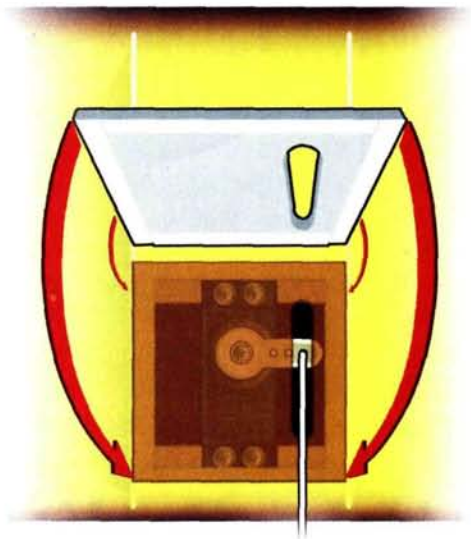
Joseph Grossman, Spring Hill, FL

GET THE KINKS OUT

Some fuel tanks have blunt noses, and if they're pushed too far forward, the fuel lines can kink and stop the flow of fuel to your engine—usually at the most inconvenient time! Before you install the tank, take a piece of foam pipe insulation and, with a dab of silicone, glue it to the firewall where the tank would come into contact with it. This will prevent the tank from moving forward and will also keep vibrations from being transmitted to the tank.

Matt Campos, Downers Grove, IL





COVER-UP

Covering open aileron servo bays with a hatch reduces drag, provides protection from dust, dirt and fuel and improves the model's appearance. Most hatches are made out of wood and can be complicated to make. It's easier to cut a hatch from 0.020- or 0.030-inch-thick styrene plastic to fit the servo opening. Make the cutout for the pushrod, and attach double-sided tape to the perimeter of the hatch. After the servo has been mounted with the pushrod, slide the hatch over the pushrod and press the hatch down. Before you install the hatch, you could paint it to match the wing.

Steve Aldridge, Boise, ID

PILOT PROJECTS

SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable but please do not send digital printouts. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

▲

Hanns J. Bell, Victoria, TX
QUAKER 2000

While attending the Festival of Giants in St. Charles, IL, Hanns found a plan for a 1937 free-flight Quaker 2000. He modified the design to include a three-part, bolt-on wing and to accommodate 4-channel radio control. Covered in heat-shrink film, this 110-inch-span plane weighs 8 pounds. Fitted with an O.S. Surpass .52, this speed demon lifts off in 3 feet, and at ¼ throttle, it can buzz the crowd with a 10mph flyby.

Russ Knapp, Seattle, WA
BOEING F4B-2

Scratch-built from original Boeing drawings, it took three years for Russ to complete this stunning 1/6-scale model. The 11¼-pound Golden Age model is built just like the full-scale airplane. The fuselage is covered with 1/64-inch plywood wherever aluminum was used in the original and Coverite is used for the fabric areas. Removable panels provide access to the battery, radio system and fuel tank. The 60-inch wings have scale rib spacing and feature a scale airfoil. Russ powers the model with an O.S. FS .91 4-stroke engine for a more realistic sound, and he says it's a stable flyer and is very gratifying to watch.

▼

Mike Huckins, Albuquerque, NM
WORLD MODELS MIDGET MUSTANG

Mike did a fine job on this World Models Midget Mustang ARF. He stuffed an O.S. 1.08 engine under the cowl, replaced the wire landing gear with an aluminum gear and ran a dual-elevator-servo setup. Mike remarks that this .60-size plane is a great flyer but lands extremely fast.

Ed Durand, Aylmer, Quebec, Canada
ALPHA JET FORMATION

Ed wanted something different to fly at his club field and this is what he came up with. Scratch-built mostly of balsa, the four Alpha Jets are linked by carbon-fiber rods. The formation has a span of 60 inches, weighs 4½ pounds and uses an O.S. .40 for power; Ed uses a Futaba T6XA for throttle, nosewheel steering, ailerons and elevator to fly the unique model. He tells us the wings of the last jet act as the elevator, and it flies like a trainer and looks really neat in the air.

Randy Martin, Manvel, TX
CARDEN CAP 232

Randy really enjoys the 3D performance of his Carden 40-percent CAP 232. The 16hp Desert Aircraft 150 engine turns a 32x10 Menz propeller and provides great vertical performance. Covered with MonoKote, this bird weighs just under 38 pounds. Randy relies on an Airtronics Stylus with twin receivers and nine Airtronics 200 oz.-in. servos to control this 116-inch-span beauty.

Mike Hawkins,
Bangkok, Thailand
POLIKARPOV I-152

Mike inspected and photographed a restored full-size Polikarpov I-152 at the Warbirds over Wanaka Airshow in New Zealand, and then he built this 1/6-scale model that spans 67 inches and weighs 11¼ pounds. It's covered with Solartex and sprayed with polyurethane paint and uses a Laser 1.50 4-stroke and a 16x8 prop for power. The plane has completed six flights, and Mike plans to fly at the Quarter Scale Meet in Las Vegas.

Santiago Bernal,
Bogotá, Colombia
TUCANO

Santiago built this sharp-looking Tucano from a plan that he bought from Model Hub Spain. For outstanding performance, he installed a SuperTigre .90 2-stroke that swings a Master Airscrew 12x10 propeller. He covered the model with MonoKote and uses a Hitec radio to perform many thrilling maneuvers. Santiago says that he has more than 50 exciting flights on his model.

Phil Greasley,
Yorktown, VA
TOP FLITE SEA FURY MKII
This popular model is painted in the U.K. Royal Navy's colors using Rustoleum enamel protected with clear LustreKote. Phil has an O.S. .91 Surpass 4-stroke engine under the cowl. He remarks that his scaled-out model incorporates Century Jet scale retracts, flaps, a cockpit kit, panel lines and more than 3,000 rivets. We are sure that this plane is a big hit at Phil's flying field.

Jeff Pogar,
East Patchogue, NY
LANIER LASER 200
Jeff sent us this photo of his ¼-scale Laser built from the popular Lanier kit. The patriotic-looking model is covered with Top Flite MonoKote, and Jeff used LustreKote paint on the cowl, wheel pants and canopy to match the covering. He appropriately named the big aerobat "Freedom." A SuperTigre 2300 that turns a Zinger 18x10 prop powers the 11½-pound plane. Jeff says it's a real blast to fly!

John Lewis,
Mechanicsville, VA
1939 BERRYLOID TROPHY WINNER
John built this old-timer from a plan that was published in the December 2001 issue of *Model Airplane News*. After building it, John used cream and green UltraCote to capture that "classic" look. The 72-inch-span model weighs just over 6 pounds, uses a JR X783 radio for flight controls and is powered by a Saito .50 Golden Knight 4-stroke engine. John likes the way the old classic flies, especially at ⅓ throttle.

Almost BIPLAN

by the Model Airplane News *crew*

Dymond Tiger Moth

Kyosho Super Stearman

Dave Patrick Models 1.20 Ultimate Bipe

Ready-To-Fly PLANES

Global Fokker D-VII

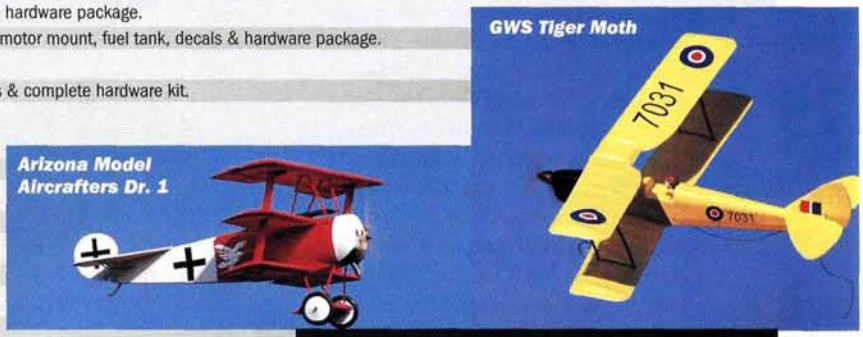
For many, the biplane symbolizes the romance of aviation. The sight of dual wings silhouetted against a setting sun is very special. Model biplanes also have a special quality, and you see it every time a new biplane arrives at the flying field. Everything seems to stop, and all attention is drawn to the shiny new biplane while its owner assembles it before its first flight. When you fly a biplane for the first time, you'll feel the magic as well. From antique WW I fighters to high-performance aerobatic competiton machines, biplanes are in a class by themselves.

In this guide, we have information on many of the most popular almost-ready-to-fly multi-wing flyers. From giant-scale to backyard electrics and everything in between, you're sure to find a kit that will satisfy your need for multi-wing fun!

ALMOST-READY-TO-FLY BIPLANES

MODEL	MANUFACTURER	ENGINE	SPAN (IN.)	LENGTH (IN.)	WEIGHT (LB.)	WING AREA (SQ. IN.)
Albatros D5	Arizona Model Aircrafters	S 2500 (2) US 41 (4)	88	69.2	15	2,550
Fokker Dr. 1	Arizona Model Aircrafters	S 2500 (2) US 41 (4)	70.5	58	13-14	2,016
Fokker D7	Arizona Model Aircrafters	S 2500 (2) US 41 (4)	88	67	21	2,660
Fokker D8/E5	Arizona Model Aircrafters	S 2500 (2) US 41 (4)	84	51.375	13-14	1,162
Ultimate	Aeroworks	DA 150 (gas)	99.5	103	38-40	3,300
Pitts Special	Great Planes	1.6-2.7 (2) 2.5ci (gas)	68.5	70	14-16	1,303
De Havilland Tiger Moth	Arizona Model Aircrafters	1.20 (4)	88	69.4	13	2,247
Tiger Moth	Dymond Modelsports	.91 (2) .91 (4)	70	54	9.93	1,400
Sopwith Pup	Arizona Model Aircrafters	.90-1.20 (4)	77	53	12-14	1,985
Vickers Vimy	3 Sea Bees Models	.90-1.20 (2) 1.50-1.80 (4)	163.4	106.4	43	7,621
Ultimate	Dave Patrick Models	.90-1.20 (2) .90-1.20 (4)	60.5	64.5	9.5-10.5	1,230
Tiger Moth	Pacific Aero Models	.90 (2) 1.20 (4)	78	65.7	10-11	1,841
Tiger Moth	Robbe Modellsport	.90 (2) 1.20 (4)	69.3	57.5	10.1	1,317.5
Standard J-1	3 Sea Bees Models	.80-1.20 (2) 1.20-1.50 (4)	105	63.8	13..6	3,917
Macchi M-7	3 Sea Bees Models	.80-.90 (2) .90-1.20 (4)	79.5	64.8	14.5	1,965
Stearman PT-17	3 Sea Bees Models	.69-.90 (2) .90-1.20 (4)	77.2	59.6	14.5	1,888
Tiger Moth	Great Planes	.61-.75 (2) .91 (4)	71	55	10.25	1,360
1917 Bristol F2B (Bristfit)	3 Sea Bees Models	.60-.90 (2) .90-1.20 (4)	94	62	16.2	2,422
Albatros C-1	3 Sea Bees Models	.60-.90 (2) .90-1.20 (4)	102	64	16.1	2,551
RAF BE2C	3 Sea Bees Models	.60-.90 (2) .90-1.20 (4)	88.4	65.4	16	2,281
Japanese Willow	3 Sea Bees Models	.60-.80 (2) .90-1.20 (4)	87.9	64.4	12.5	17.45
Phoenix D-III	3 Sea Bees Models	.60-.80 (2) .80-.90 (4)	78.4	52.4	14.5	2,088
Spad XIII	3 Sea Bees Models	.60-.75 (2) .80-.90 (4)	68.9	47.6	11.5	894
Focke Wulf FW44	3 Sea Bees Models	.60-.75 (2) .80-.90 (4)	72	58.4	11.3	1,108
Ultimate 10-300	Carl Goldberg Products	.60 (2) .90-1.20 (4)	54	58.5	7.5-8.5	980
Thomas Morse Scout 54-C	3 Sea Bees Models	.60 (2) .70-.90 (4)	63.6	45.7	9	1,610
Sopwith Triplane	3 Sea Bees Models	.46-60 (2) .60-1.08 (4)	65	45.8	11	1,488
Diablotin Bipe	Esprit Model	.46-.90 (2)	60.5	65	5.5-7.5	1,850
Fokker Dr. 1	Great Planes	.46-.75 (2) .52-.80 (4)	60	48	9.1	1,312
Nieuport 17-C 1916 French	3 Sea Bees Models	.46-.60 (2) .60-.80 (4)	66	46	8.4	947
Fokker D-V	3 Sea Bees Models	.46-.60 (2)	68.9	47.6	9.3	966
Tummelisa Swedish 1920 Trainer	3 Sea Bees Models	.46-.60 (2) .65-.80 (4)	63	43	9.45	925
Ultimate Bipe	Global	.46-.53 (2) .52-.80 (4)	43	47	5.75	732
Tiger Moth	Dymond Modelsports	.46 (2) .52- .56 (4)	52	38	8.55	900
Fokker Dr. 1	Arizona Model Aircrafters	.46 (2) .52 (4)	60	48	7	1312
Rebel Bipe	Lanier	.45-.60 (2) .80-.90 (4)	50	35	7	700
Fokker D-VII	Global	.40-.46 (2) .52 (4)	48.75	43	5.5-6.5	742.75
PT-17 Stearman Bipe	Kyosho	.40-.46 (2) .52 (4)	49.5	39	5.7	716
Pitts Special	Kyosho	.40-.46 (2) .50 (4)	46	42	5.7-6.0	688.8
Super Stearman	Kyosho	.40-.46 (2) .48-.53 (4)	49.4	39	5.75	717
Tiger Moth	Kyosho	.40-.46 (2) .48-.53 (4)	54	44	5.7-6.2	899
Ultimate 40	Dave Patrick Models	.40-.45 (2) .52-.63 (4)	43.5	46	5-5.5	630
Tiger Bipe 40	Thunder Tiger	.36-.40 (2) .35- (4)	49	43	4.5	635
Ultimate 30	The World Models Mfg.	.32 (2) .40 (4)	42	39	5	578
WACO	Sportsman Aviation	.30 (4)	40	29.5	3.5	470
WACO	Sure Flite	.25-40 (2) .40-.60 (4)	49.5	37.5	4.1	620
De Havilland Tiger Moth	Pacific Aeromodel	.15-.25 (2) .26-.30 (4)	50	41	3.7-4.1	723
Electrics						
Stearman PT-17	Robbe Modellsport	280 4.5:1	32.68	24.8	12.3 oz.	372
Bücker Jungmeister	Robbe Modellsport	280 4.5:1	31.1	28.3	10.6 oz.	961
Sopwith Pup	Kavan	280 3.4:1	31	24	15 oz.	375
KavanShot	Kavan	280	18.7	15.74	6.5 oz.	147.25
Fokker Dr. 1	Kavan	280 3.43:1	31.1	24	11.64	356
Albatros D.V.	Kavan	280 3.43:1	31.1	24.8	10.9 oz.	271
Sopwith Triplane	Kavan	280 3.43:1	33.8	30.7	11.64 oz.	380
De Havilland DH-2	Kavan	280 3.43:1	33.8	30.7	11.64 oz.	380
Fatty Sparrow	Dymond Modelsports	300 5:1	34	34	12.5 oz.	380
Albatros D VV	Great Planes	Ecodrive 300 5:1	34	37	10.5 oz.	360
Tiger Moth	Grand Wing Servo	Geared motor	31.5	26.4	7.6-9.7 oz.	288
Fatty Sparrow	Hobby Lobby	Power Drive 350	33	25	22 oz.	465
Albatros D.V	Scorpio	Speed 300 4.5:1	34	29	14 oz.	340
Nieuport 28	Scorpio	Speed 300 4.5:1	32	24	15 oz.	380
Pitts Special	Hobby Lobby	Speed 300 5:1	23	20.5	13 oz.	210
Sunwheel Biplane Slow Flyer	Graupner	Speed 400	35	32	21 oz.	430
S.E.5a	Dymond Modelsports	Speed 400	35.8	28.3	19.4 oz.	519

PRICE	NOTES/FEATURES
$825	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & complete hardware kit.
$749	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & complete hardware kit.
$795	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & complete hardware kit.
$695	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & complete hardware kit. Release Spring 2003.
$2,000	All wood, iron-on covering, fiberglass cowl & wheel pants with optional hardware package available.
$399.99	All wood, MonoKote covered, fiberglass cowl & wheel pants, hardware package, wheels, 4-in. aluminum spinner & decals.
$550	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & very complete hardware kit.
$289	All wood, Oracover covering, fiberglass cowl, engine mount, wheels & complete hardware kit.
$625	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & complete hardware kit. Release end Nov 2002.
$1,495	All wood & comes complete with static prop, dummy engine & wheels, fully covered, with complete hardware.
$399.99	All wood, UltraCote covering, fiberglass cowl & wheel pants, engine mount & complete hardware kit.
$399.99	All wood, iron-on covering, fiberglass cowl, engine mount, wheels & complete hardware kit.
$430.22	All wood, iron-on covering, fiberglass cowl, wheels, motor mount, hardware package.
$949	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$829	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$899	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$299.99	All wood, interlocking parts, MonoKote covered, hardware package & decals.
$949	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$999	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$949	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$839	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$749	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$765	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$849	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$359.95	All wood, UltraCote covering, fiberglass cowl and wheel pants, engine mount, wheels and complete hardware kit.
$725	All wood and comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$879	All wood and comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$399	All wood, iron-on covering, ABS cowl, wheels, motor mount, hardware.
$299.99	All wood, MonoKote covered, fiberglass cowl, hardware, wheels, decals.
$725	All wood and comes complete with static prop, dummy engine, standard wheels, fully covered; complete hardware.
$765	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered; complete hardware.
$745	All wood & comes complete with static prop, dummy engine, standard wheels, fully covered, with complete hardware.
$199.99	All wood, polystyrene film covering, fiberglass cowl, wheel pants, canopy, hardware, decals.
$189	All wood, Oracover covering, fiberglass cowl, engine mount, wheels & hardware kit.
$279	All wood, Oracover covering (requires painting), fiberglass cowl, engine mount, wheels & hardware kit.
$134.99	ABS fuselage, foam wing & tail surfaces, fuelproof covering.
$199.99	All wood, iron-on covering, fiberglass cowl, wire-spoke wheels, dummy machine guns, sticker sheet & hardware package.
$249.99	All wood, iron-on covering, fiberglass cowl, wheels, motor mount, hardware package.
$229.99	All wood, iron-on covering, fiberglass cowl & wheel pants, wheels, motor mount, fuel tank, decals & hardware package.
$239.99	All wood, iron-on covering, fiberglass cowl & wheel pants, wheels, motor mount, fuel tank, decals & hardware package.
$249.99	All wood, Solartex covering, fiberglass cowl, wheels, motor mount, fuel tank, decals & hardware package.
$249.95	All wood, UltraCote covering, fiberglass cowl & wheel pants, engine mount & complete hardware kit.
$169.99	All wood, UltraCote covering.
$159	All wood, iron-on covering, fiberglass cowl, wheels, motor mount, hardware package.
$149.99	All wood, iron-on covering, fiberglass cowl, wheel pants, wheels, motor mount, fuel tank, decals & hardware package.
$74.95	Painted foam, molded-plastic parts, wheels, decals & hardware.
$199.99	All wood, iron-on covering, fiberglass cowl, engine mount, wheels & complete hardware kit.
$102.80	Painted foam, decals.
$102.80	Painted foam, decals.
$115	Painted foam, molded-plastic parts, wheels & hardware.
$74.99	Painted foam, molded-plastic parts, wheels, decals & hardware.
$109.99	Painted foam, molded-plastic parts, wheels, decals & hardware.
$109.99	Painted foam, molded-plastic parts, wheels, decals & hardware.
$99.99	Painted foam, molded-plastic parts, wheels, decals & hardware.
$123.99	Painted foam, molded-plastic parts, wheels, decals & hardware.
$99.95	Painted foam, molded-plastic parts, wheels, decals & hardware.
$129	Painted molded foam, hardware package, wheels, pilot, spinner & dummy Mercedes in-line engine.
$54.99	Painted foam, molded-plastic parts, wheels, decals & hardware.
$89	Painted foam, molded-plastic parts, wheels, decals & hardware.
$89	Painted foam, molded-plastic parts, wheels, decals & hardware.
$89	Painted foam, molded-plastic parts, wheels, decals & hardware.
$89	Painted foam, some wood, geared Speed 300 motor, molded-plastic parts, wheels, decals & hardware.
$79	Painted foam, molded-plastic parts, wheels, decals & hardware.
$84	Painted foam, molded-plastic parts, wheels, decals & hardware.



BALANCING ACT

For all their great looks and style, there's a price to pay when you set up a multi-wing flyer. Like all models, to fly right, biplanes must be balanced properly. With two wings to consider, however, the balancing act is a little more complicated than with a monoplane. Here are a few tips to take the guesswork out of this important setup step.

Before you can balance any biplane, you must first determine its mean aerodynamic chord (MAC). The MAC is the chord that represents the wings as a whole about which lift, drag and pitching moment forces act upon. The MAC for a constant-chord, straight-wing biplane (with no wing stagger) is the chord of the top wing. The MAC for a biplane with staggered wings is simply the combination of the top wing's chord and the horizontal stagger distance (Figure 1). To find the balancing point, measure 25 percent of the MAC back from the top wing's leading edge.

To find the MAC for a biplane with a swept top wing and a straight bottom wing, see Figure 2. Once you have determined the MAC, measure 25 percent of the MAC back from the leading edge and mark it on both top wing panels. Connect the two points with a line, and then balance the biplane along this line.

FIGURE 1.

To determine the MAC of a straight-wing, positive-stagger biplane, add the top wing chord to the amount of stagger between the two wings. The CG should then be set at 25 percent of the MAC. If there is no stagger, then the MAC is the chord of the upper wing.

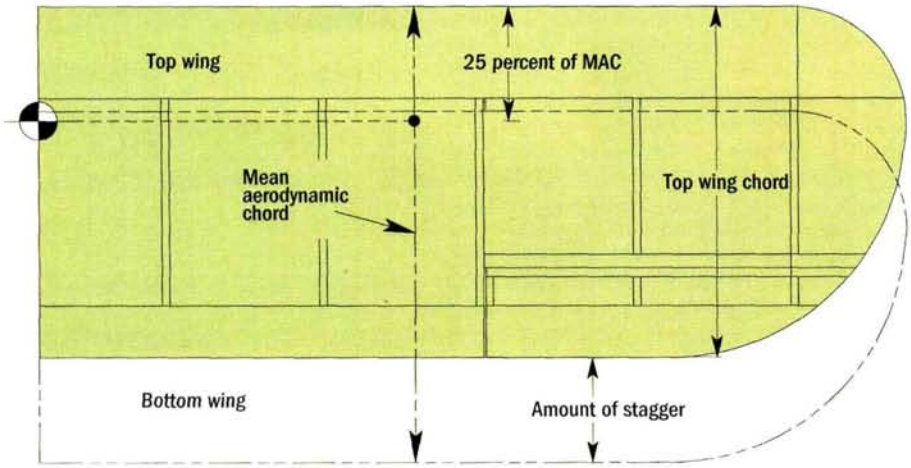
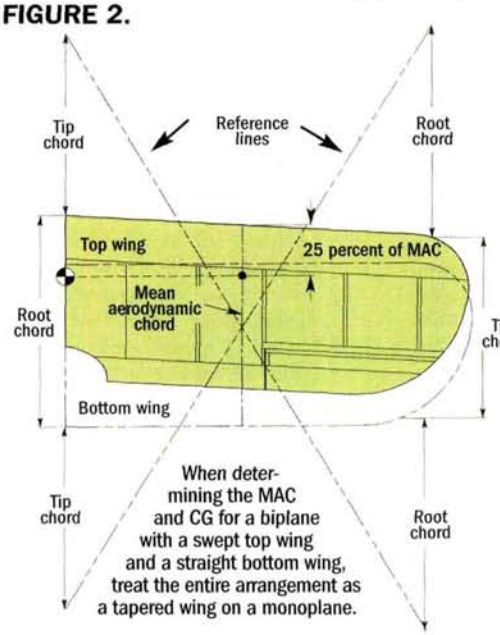


FIGURE 2.



FLYING BIPLANES

Even though you do have to set up two wings, biplanes are no more difficult to fly than any other type of model; they're just different! Biplanes produce more drag and require slightly more power than monoplanes do. With their relatively shorter wingspans, bipes roll more quickly; most require only slight up-elevator to take off after a ground run, and they may even require slight forward stick pressure to keep its departure at a reasonable angle. Use at least ½ throttle for normal cruise, and remember to use rudder to coordinate your turns. At times, I have found it beneficial to first use rudder and to then feed in aileron to make smooth turns; it all depends on the model.

On final approach and landing, use more power than usual, and control airspeed with elevator. Control the descent rate with small throttle changes; don't dive the plane to lose altitude, or you'll increase airspeed and upset the landing approach. Don't chop throttle too soon, either; if you do, you will most likely land short of the runway! Done just right, beautiful spot landings are possible with little effort. Just keep the nose pointing down slightly to maintain adequate airspeed. As with any other type of model, if you balance and power your biplane properly, it will behave as it should and won't surprise you.

DRESSING UP YOUR BIPE

If you're looking for ways to spruce up that twin-wing beauty, one of the easiest is to add scale accessories. From cockpit coaming and flying wires to machine guns and dummy engine cylinders, it's the little things that bring a model to life. Here's a list of the sources of all those neat little add-ons.

WILLIAMS BROS. supplies a wide variety of products, including vintage, smooth-contour, Golden-Age and balloon-style wheels, scale pilot figures from 1/12 to 1/4 scale in various styles, scale dummy radial-engine kits and machine guns from 1/6 to 1/4 scale. Williams Bros. (805) 534-1307; williamsbrosinc.com.

PROCTOR ENTERPRISES provides a good selection of products for adding realism. The company's outstanding catalog shows hundreds of accessories, such as vintage, balloon, smooth-contour and Golden-Age-style wheels, including spoked wheels; scale machine-gun kits; static scale props and prop decals; scale dummy-engine kits; vintage instrument bezels; cockpit trim and miniature screws. Proctor also sells mounting hardware, fittings, pulleys and turnbuckles.
Proctor Enterprises (503) 678-1300; proctor-enterprises.com.

3 SEA BEES offers a wide assortment of finely detailed accessories for its line of vintage biplanes. They can also be used to dress up your own flyer. Authentic-looking spoked wheels, static-scale propellers with an aluminum hub plate and screws, scale dummy engines, wire rigging, turnbuckles, complete cockpit kits, full-figure pilots and scale machine guns can all be found in the 3 Sea Bees catalog.
3 Sea Bees Models (425) 334-6089; 3seabees.com.

ARIZONA MODEL AIRCRAFTERS has an excellent selection of accessories for sprucing up any vintage biplane or triplane. Spoked-wheel kits, scale machine-gun kits with brass ammunition, instrument detail kits and vintage dummy-engine kits are just some of this company's offerings.
Arizona Model Aircrafters (480) 348-3733; arizonamodels.com.

RAM RADIO CONTROLLED MODELS. For a true-to-life biplane flying experience, Ram has a great sound module that produces that distinctive crackle of machine-gun fire.
Ram Radio Controlled Models (847) 740-8726; ramrcandramtrack.com.

DOIN' THE BIPLANE BOOGIE

by Budd Davisson

PHOTO BY BUDD DAVISSON

You gotta love biplanes. Well, maybe you don't have to, but those of us who spend hundreds of hours a year sandwiched between wings and cocooned by wires find it hard to imagine ourselves riding around in something "normal" like a Cessna or a Piper. That kind of aviation is rational and makes sense. Biplanes don't. They don't have to. And they feel so good!

Most folks think biplanes are old-fashioned and afflicted with the creaks and groans of old age; and in some cases, they're right. Strap into something like a Curtiss Jenny, and you gain a new appreciation for our pioneers who considered just leaving the ground to be a miracle. In those early days, speed was a happy accident, and the ability to air-dance was limited to rickety swoops and dives with an occasional loop.

Biplanes, however, vary widely. Look at the Jenny and its web-like exoskeleton of wires: it is the very definition of parasite drag. Then study the Beechcraft Staggerwing, which has curves so sensual it should be illegal.

Today, it would be easy to think the biplane has gasped its last, but that simply isn't true. As I tumble through the sky in my Pitts Special, which is nothing less than an artillery shell with wings, I look out at those stubby, fabric-covered protuberances and know that for a brief time, gravity no longer exists. My little biplane lets me rewrite the laws of physics, if only for a few minutes.

To a certain type of pilot, the biplane isn't an oddity; it's a necessity.

3 Sea Bees Models Inc. *(425) 334-6089; 3seabees.com.*
Ace Hobby Distributors *(660) 584-6704; acehobby.com.*
Aeroworks *(303) 366-4205; aero-works.net.*
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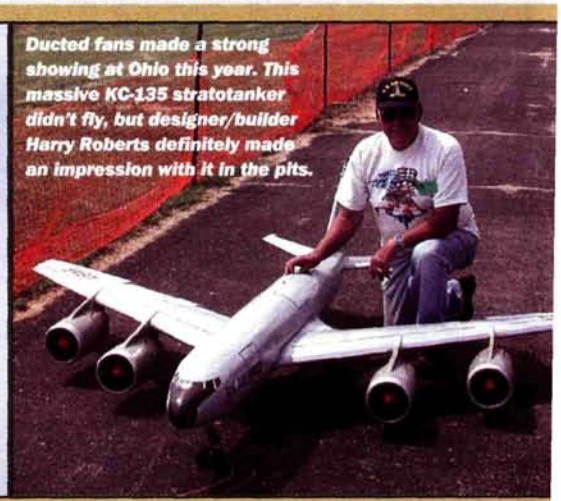
Heart of

Bob Violett's creations are always among the most popular at jet events; Bob's own F-100D made multiple flights throughout the weekend. Its sister ship, a twin cockpit F-100F that won top honors at the most recent Top Gun competition, was on display in the pits.

Glenn Robinson won Best Finish in the Sport category for this BVM Bandit done up in the "aggressor" paint scheme of the pseudo MiG-28s from the movie "Top Gun." Fortunately, the RAM turbine sounded cool enough to drown out any thought of Kenny Loggins' theme song!



Ducted fans made a strong showing at Ohio this year. This massive KC-135 stratotanker didn't fly, but designer/builder Harry Roberts definitely made an impression with it in the pits.

Ohio JET SCRAMBLE

by Matt Boyd

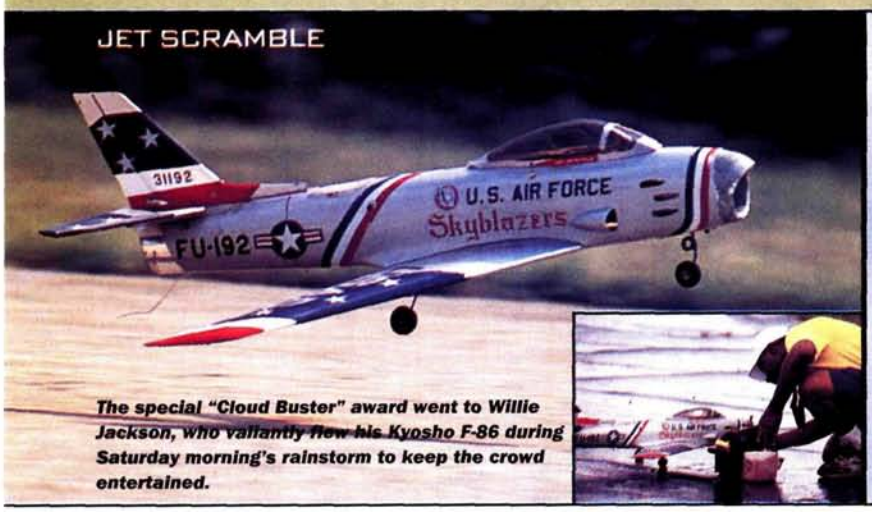
Ever since the Heinkel He 178 became the first jet-powered aircraft to take flight, jets have been symbols of technological achievement for entire nations: they are icons that embody engineering expertise, financial resources and military might. Jets are considered by most folks to be the ultimate machines.

The ultimate model aircraft cut loose

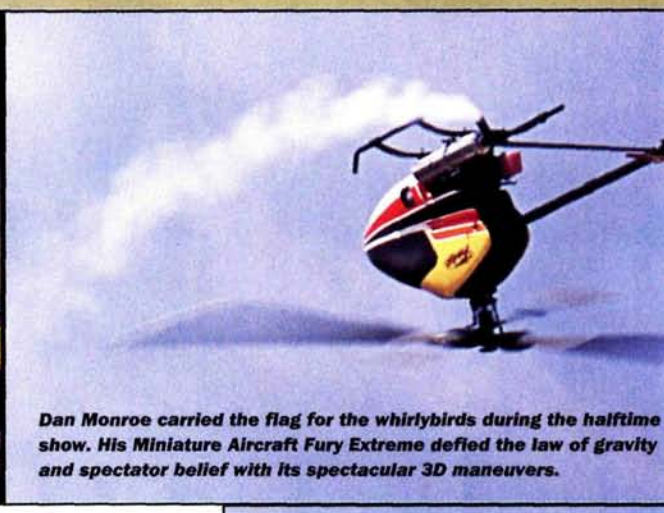
The weekend's highlight was the flyby of the full-size Super Saber. Check out that tongue of flame as pilot Dean "Cutter" Cutsall nails the afterburner!

PHOTOS BY MATT BOYD

Lewis Patton shows off Century Jet Models' new Talon T-500 advanced trainer.



The special "Cloud Buster" award went to Willie Jackson, who valiantly flew his Kyosho F-86 during Saturday morning's rainstorm to keep the crowd entertained.



Dan Monroe carried the flag for the whirlybirds during the halftime show. His Miniature Aircraft Fury Extreme defied the law of gravity and spectator belief with its spectacular 3D maneuvers.

Certainly this holds true in the world of RC, and the 2002 Heart of Ohio Jet Scramble was my opportunity to see these ultimate model machines up close and in action. Now in its 12th year, the Jet Scramble has become one of the country's premier jet events, and the registration list is a veritable who's who in the jet-modeling world. But what truly sets this event apart is the emphasis that contest director Terry Nitsch and his staff from The Ohio Radio Kontrol Society (TORKS) place on making this three-day extravaganza entertaining for spectators. The level of community support and interaction is as high as I've ever seen at an RC event; all that effort translates into a fun experience for the public and positive exposure for the hobby. The Jet Scramble was an unquestionable success; over the course of the weekend, it drew an estimated 5,000 spectators, and nobody went away disappointed.

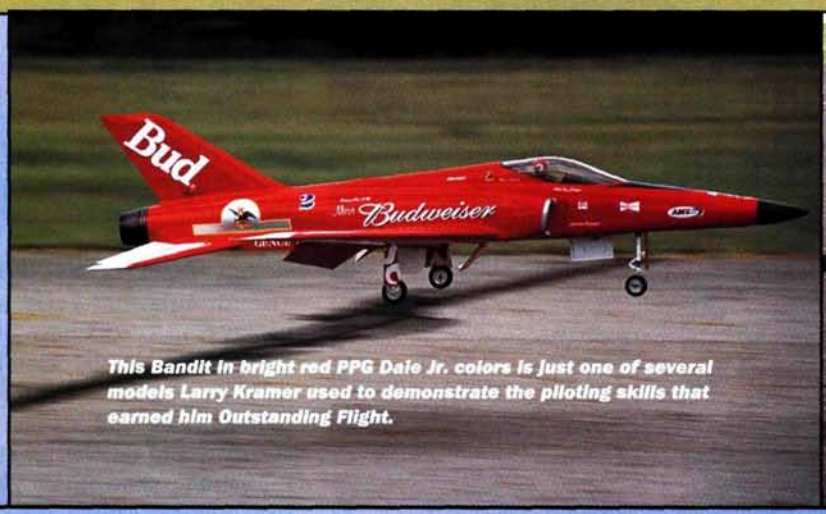
As in past years, the Jet Scramble was held at Darby Dan Airport just outside of Columbus, OH. This exceptional facility for model aircraft, together with the preparation and organization put forth by the staff, made it a smooth-running event from start to finish; no easy task with 88 registered pilots and more than 200 aircraft, many capable of speeds of 200mph+. There was a nice mix of turbine and ducted-fan aircraft, and jets of all sizes and styles—from ultra scale to wacky sport jobs—made it the most diverse ever field for a jet event. The dedicated pit and staging area contained nearly 20 blast-shield-equipped pit stalls and had access to the runway at both ends. Six pilot stations were available at all times, each with an assigned staffer who served as a spotter. Each spotter maintained constant contact with the others and the pit boss via walkie-talkie, ensuring that all the pilots were kept up to date on conditions and potential hazards.

AIR SUPERIORITY

The Heart of Ohio Jet Scramble is more about demonstration than competition; the focus for the pilots was to stage the best show for the fans and for their fellow modelers. A few awards were given: Glenn Robinson won Best Finish Sport for his BVM Bandit done up in the "aggressor" black paint scheme of the imitation MiGs from the movie "Top Gun." Scot Greenia's Bandit won Bes Graphics/Markings. Hardest Landing wen to Jerry Conley; his jet flew apart i midair at show center! Larry Kramer col lected the Outstanding Flight Sport awar for his skill at the sticks with multiple ai craft throughout the weekend. Mitc

Another brand-new kit making its shakedown run this year was the Golden West Models Blade. It was so new that owner Jim Hiller hadn't yet had time to paint it.

Nothing catches the eye of modelers like a unique, scale-jet design. The Fiber Classics Euro Fighter is a perfect example; the 66-inch-wingspan fighter was flown by Bob Oliva.



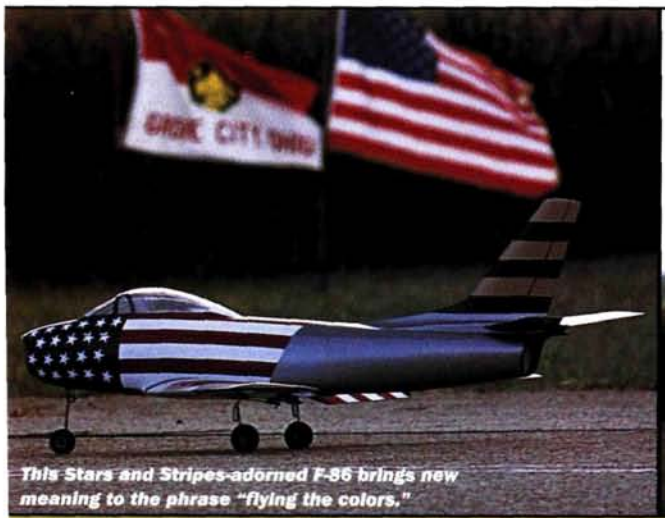
This Bandit in bright red PPG Dale Jr. colors is just one of several models Larry Kramer used to demonstrate the piloting skills that earned him Outstanding Flight.

Mitch Weiss shows off the cockpit and finish detail of his BVM F-100 that helped him earn Best Craftsmanship.

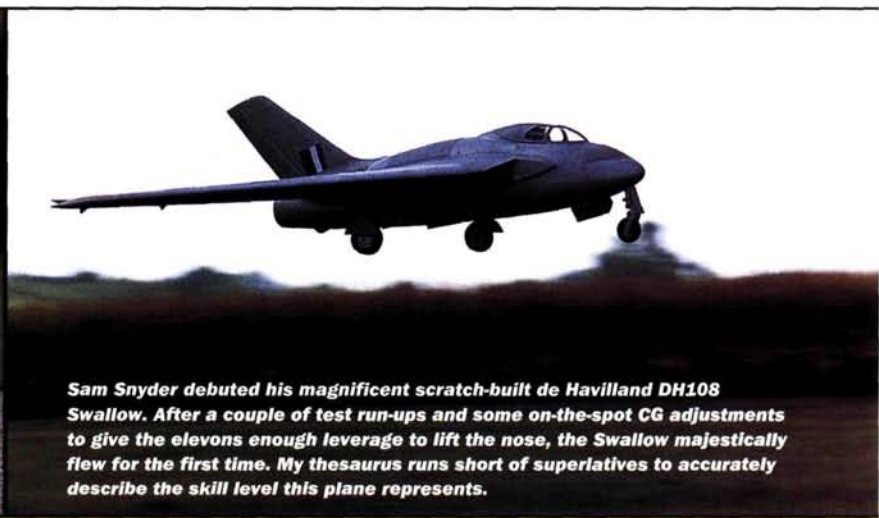
To show off the thoroughly redesigned BVM F-86 kit, Bob Violett made successive super-low-and-slow passes with "Beauteous Butch II" for the spectators. This Saber was designed specifically for a turbine, and it has a fully detailed cockpit.

Weiss earned a well-deserved Best Craftsmanship award for his BVM F-100D. Sam Snyder's beautifully detailed and unique scratch-built de Havilland Swallow easily claimed Best Scale. A special "Cloud Buster" award went to Willie Jackson for flying in inclement weather. A brief but fairly heavy shower on Saturday morning sent most spectators and pilots scurrying for cover, but Willie stayed out there throughout with his Kyosho F-86 and kept the crowd entertained.

As in previous years, Bob Violett showed off several of his company's spectacular scale kits, including a BVM F-100D and a thoroughly re-engineered F-86F Sabre. The Sabre, in particular, dubbed the "Beauteous Butch II," wowed the crowd with a series of super low-and-slow flybys. Other key moments included the debut of Century Jet Models' new Talon T-500 advanced jet trainer. This unique design flew quite well at the hands of noted pilot Lewis Patton, and its combi-



This Stars and Stripes-adorned F-86 brings new meaning to the phrase "flying the colors."



Sam Snyder debuted his magnificent scratch-built de Havilland DH108 Swallow. After a couple of test run-ups and some on-the-spot CG adjustments to give the elevons enough leverage to lift the nose, the Swallow majestically flew for the first time. My thesaurus runs short of superlatives to accurately describe the skill level this plane represents.

HALFTIME HIGHLIGHTS

Above: Frank Knoll Jr. put on an aerobatic clinic with his Carden Edge 540—and, no, the photo is not fake, thank you very much! Right: it's raining candy! (Well, almost.) The candy drop from Ed Bowers' full-size Super Cub was a winner with the kids during the midday break.

As if the multitude of spectacular jet models wasn't enough, Terry Nitsch and his crew had also arranged for a slew of halftime activities to keep the crowd (and the other pilots!) smiling. As in previous years, Frank Knoll Jr. put on an aerobatics clinic with his Carden Edge 540. Dan Monroe proved that fixed-wingers aren't the only craft that can perform aerobatics at that level; he demonstrated jaw-dropping heli dexterity with his Miniature Aircraft Fury Extreme. The Jet Scramble has always attempted to involve the younger members of the community. This year, the kids got a special treat on Friday and Saturday as Ed Bowers flew his full-size Super Cub over Darby Dan and dumped out a load of candy for the kids to scramble after. This was a big success and most little faces sported big smiles as they carted off their loot.

As enjoyable as these events were, by far the biggest hit came on Sunday afternoon. And when I say "big," I mean it! Try 39 feet wingtip to wingtip, 54 feet nose to tail and a weight of nearly 17 tons! Oh, and then there is the little matter of 17,000 pounds of roaring thrust, as Dean "Cutter" Cutshall cut loose his full-size North American F-100 Super Sabre at 100 feet off the deck with the afterburner lit! He did a series of passes for the crowd, and nobody there will ever forget the sight or the sound of that fighter as it blasted by.

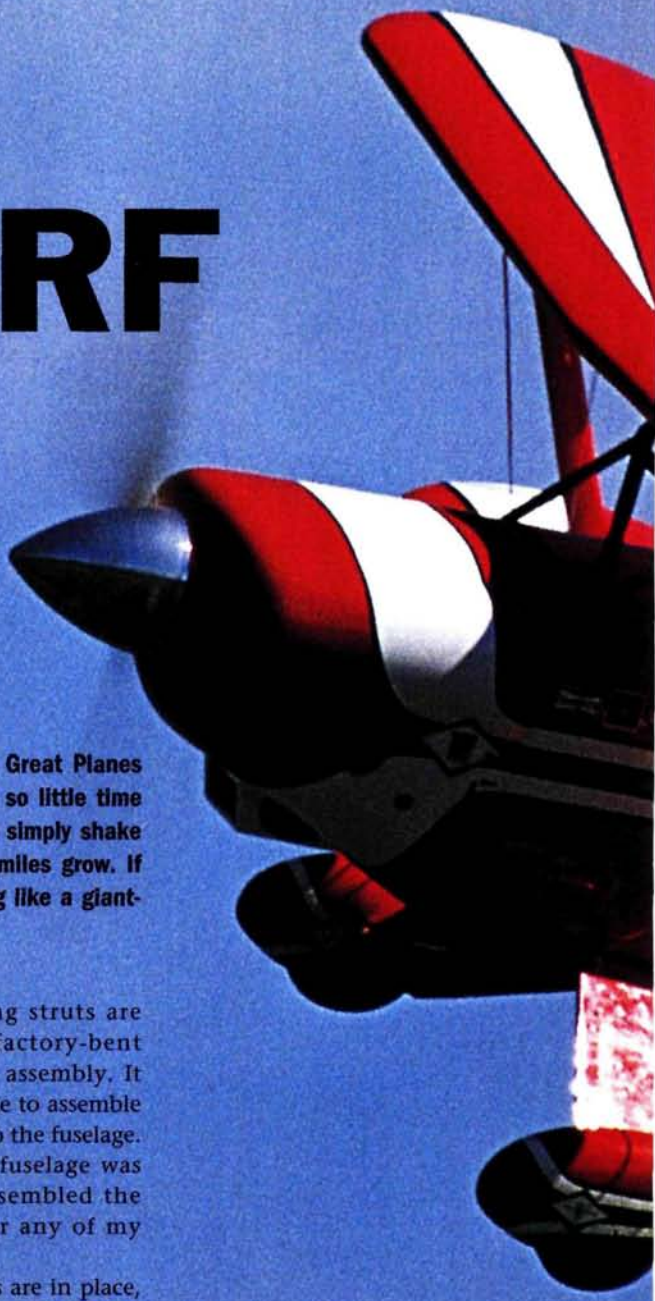
nation of easy assembly, sleek looks and all-speed will make it popular in years to come. The Golden West Models Blade also debuted with Jim Hiller at the controls.

CLOSING THOUGHTS

The formula that Terry Nitsch and members of TORKS have hit upon for the Heart of Ohio Jet Scramble has certainly proven to be a success over the past 12 years, and it's one that other events would do well to study. From the photos, you can see that the first part involves getting topnotch pilots and builders to attend, bringing with them most advanced and well-crafted models in the world, bar none. The second part isn't as obvious, but I was able to observe close up the dedication and commitment the staff demonstrated in putting on a show that draws in the community and one that everyone enjoys. Spectators who had never before seen a model airplane were drawn in, made to feel welcome and treated to a brilliant exhibition. I've no doubt that most of them will be back, and more than a few just might be pilots themselves before too long. As far as I'm concerned, the Heart of Ohio Jet Scramble is the ultimate venue to see the ultimate modeling machines in their element; you can bet I'll be going back. ✈

Great Planes Pitts Special ARF

A giant-scale S-1S in classic colors!



by Gerry Yarrish

Yes, this model is an eye-opener! Every time I take the new 1/3-scale Great Planes Pitts Special ARF to the flying field, people are amazed that I spent so little time building it. When they learn it took less than 12 hours to build, they simply shake their heads in disbelief! Once they see it fly, their amazement and their smiles grow. If these kinds of reactions are what you want, look no further! There's nothing like a giant-scale Pitts, and Great Planes got it right!

When you open the box, you have to take a few moments to admire all the big and beautiful parts. Expertly covered in MonoKote, everything is ready for assembly and very little gluing is required. The straight lower wing comes in two halves while the swept upper wing has three panels. Before you join the panels, install the ailerons and the aileron servos. The panels come with strings taped inside to help guide the servo leads to the wing root. It takes almost no time at all to assemble the wings with 30-minute epoxy. There's also a wooden belly pan that you must glue to the lower wing. This is easily done by first placing the wing in the wing saddle. The Pitts' manual is illustrated with photos, and if you read the instructions, you shouldn't have any problems putting it together.

The Pitts comes with all the alignment holes for the mounting brackets; cabane struts and interplane wing struts are already drilled, and the factory-bent attachment brackets speed assembly. It took less than an hour for me to assemble the wings and attach them to the fuselage. Wing alignment with the fuselage was perfect the first time I assembled the model. I can't say that for any of my scratch-built biplanes.

Once the wings and struts are in place, install the tail surfaces. I installed the landing gear before I attached the tail surfaces so that I wouldn't need a stand to support the model. Also, to make it easier to slide the horizontal stabilizer into its slot, I removed a small section of the fuselage just aft of the slot; then I slid the stab in from the back instead of from the tightly fitting side. With the stab in place, I glued the wedge-shaped section back into position. To speed construction, install the elevator and rudder control horns

The Great Planes ⅓-scale Pitts Special ARF is big! It's impressive on the ground and in the air.

PHOTOS BY WALTER SIDAS & GERRY YARRISH

SPECIFICATIONS

MODEL: Pitts Special ARF

TYPE: ARF biplane

MANUFACTURER: Great Planes Model Distributors

SCALE: 1/3

TOP WINGSPAN: 68.5 in.

BOTTOM WINGSPAN: 64.3 in.

WING AREA: 1,303 sq. in.

WEIGHT: 17 lb., 1 oz. (ready to fly, w/out fuel)

WING LOADING: 30.2 oz./sq. ft.

LENGTH: 70 in.

ENGINE REQ'D: 2-stroke 1.6 to 2.7ci (26 to 45cc) glow engine, or 2.5ci (41cc) gasoline engine

ENGINE USED: Fuji 50cc

RADIO REQ'D: 4-channel with 6 to 8 servos (throttle, rudder, aileron, elevator)

RADIO USED: Futaba Super 8 with 7 Futaba 3003 servos

PROP USED: Menz 20x8

STREET PRICE: $399

COMMENTS: the 1/3-scale Pitts Special ARF is a wonderful kit that goes together easily and in less time than you'd think. All the parts fit precisely, and all major alignment holes have been drilled to take the guesswork out of final assembly.

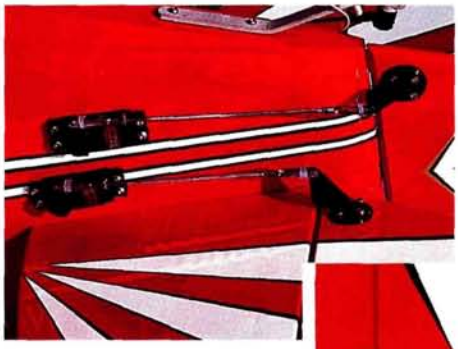
HITS

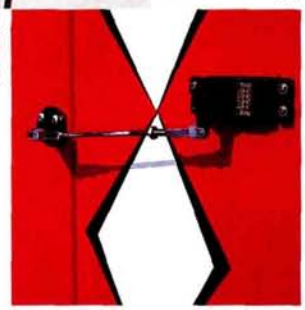
- A+ parts quality and craftsmanship.
- Great value.
- Beautifully covered with MonoKote.
- Super flight characteristics.

MISSES

- No instructions or suggestions for gasoline engine installation.
- I would like to see a birch plywood firewall used in place of the softer wood.
- Foam tires have flat spots after being stored for a while.

Though the instructions do not give any guidance for installing the Fuji 50 gas engine, the conversion is very simple and takes only a few minutes. Check all the glue joints if you intend to power your Pitts with a big gas engine.





Left: the rudder and elevator servos are in precut openings under the horizontal stabilizer. Two servos are used for the elevator (one for each half), and one is used for rudder. I added a fourth servo for separate tailwheel steering. Below: the aileron servo installation and linkage couldn't be easier. The instructions suggest one servo for each of the four ailerons, but I used two servos in the bottom wing only. I used a slave pushrod to connect the lower and upper pairs of ailerons.

before you attach the surfaces to the stabilizer and fin.

SERVO INSTALLATION

The fuselage has four servo cutouts in its tail (two on each side), and you must cut the covering open and seal it around the openings before you install the servos. The instructions call for three servos for the tail surfaces (two for the elevator halves and one to operate the rudder and tailwheel steering). Since there are four openings, I decided to install an additional servo for the tailwheel steering. This simplified the control-linkage setup and added just a little tail weight to offset the extra weight of the Fuji 50 engine.

The Pitts also has four aileron-servo openings (one in front of each aileron), and the instructions show a four-aileron-servo installation (two in the top wing and two in the bottom). This works extremely well and gives tremendous roll authority. I don't like the look of servo leads attached to the cabane struts and going from the top wing into the fuselage, so I decided to use only two servos in the bottom wing. I connected the upper and lower ailerons with scale slave pushrods. Using two or four servos works very well, and it is entirely a personal choice. I used a Futaba Super 8 and Futaba 3003 servos throughout.

The landing gear is made of aluminum, and two, thin plywood fairing pieces give the gear its proper appearance. I used Hobby Lobby PFM adhesive and two 4-40 cap-head screws to attach the fairings to the gear legs. Certain full-size Pitts Special variants used the thinner, Cessna-like gear, so again you have a choice. A little work is required to securely install the wheel pants, but reading the instructions will keep you out of trouble. Two 4-40 cap-head screws secure each wheel pant to the gear leg, and the bolt holes have already been drilled for you. My only gripe is that the foam wheels that come with the kit flatten too easily when the model is stored resting on its gear. If you plan to store the model for an extended time, block up the wheels so they don't support the model.

ENGINE INSTALLATION

As soon as the Pitts Special kit was introduced, I thought it would be ideal for the new Fuji 50cc gasoline engine (also available from Great Planes). The distance from the firewall face to the spinner backplate is 6½ inches, and the Fuji 50 fits perfectly with the optional prop-hub extension. I installed the engine inverted and attached it to the firewall with 8-32 bolts and blind nuts. You have to drill a clearance hole in the center of the firewall to clear the aft end of the crankshaft, but that's all there is to installing the big gas burner.

The muffler that comes with the engine fits easily in the cowl, but I did add a 1-inch extension piece to the exhaust pipe so it would clear the bottom of the cowl. I also replaced the stock Fuji choke plate with a Zenoah velocity stack. This makes it very easy to choke the engine for starting; I simply stick my finger in the stack while flipping the prop. I also attached an ignition kill switch to the firewall with a small plywood bracket. The switch passes through a thin slot cut in the cowl.

A big, beautifully polished aluminum spinner comes with the kit, and it fits the Fuji engine nicely with one of the included prop-shaft adapters. I used a Menz 20x8 wooden prop from Frank Tiano Enterprises, and it fit the spinner cutout nicely without alterations.

FINAL ASSEMBLY

To give the model a finished look, I installed a Hangar 9 1/3-scale civilian pilot, and I painted the cockpit interior before I installed the instrument-panel decal and the bubble canopy. I used Model Graphics decals to enhance the model's scale appearance, and I have to say that they make a huge difference. The decals come on transfer sheets and are made of thin

FLIGHT PERFORMANCE

Powered by the Fuji 50cc gasoline engine and turning a Menz 20x8 wooden prop, the Pitts Special has very impressive performance. With a ready-to-fly weight of 17 pounds, 1 ounce, its wing loading is just over 30 ounces per square foot.

TAKEOFF AND LANDING

The Pitts Special is very easy to taxi and requires only a touch of up-elevator to hold the tailwheel firmly on the ground. For the first takeoff, I taxied to the far end of the field so I would have as much runway as I could have. This wasn't necessary, as the model was well into the air before it passed me; it used maybe 100 feet to break ground. If you apply throttle smoothly and gradually, just a touch of right rudder is needed.

I kept the departure angle low until the model had gained a little more airspeed, and then I applied more up-elevator. The Pitts climbs with authority and can easily climb with only ¾ throttle. I trimmed in some down and added a bit of right aileron, and the Pitts flew hands-off at ½ throttle. Honest! It really did!

My first landing was anything but perfect, and I broke the prop! I chopped the throttle prematurely and landed about 5 feet short of the runway. The proper way to land this model is to reduce power on the downwind leg to about ½ throttle and then lower the nose to begin losing altitude. Fly the base and final legs with about ⅓ throttle, and keep the nose down. Once over the end of the runway, chop the power and level the nose. The model will slow quickly and you can begin to flare just as the wheels are about to touch down. In windy conditions, I hold just a touch of down-elevator after touchdown for a 2-wheel landing; on calm, undemanding days, I hold the model off the ground as long as I can in a 3-point attitude. Done just right, the model gently kisses the ground and doesn't even wobble—a beautiful sight!

GENERAL FLIGHT CHARACTERISTICS

Well, it's a Pitts! It can do it all if you power it adequately. With the Fuji 50cc engine, my test model flew very prototypically. At ½ throttle, low-rate elevator feels best for all-around maneuvering while high-rate ailerons keep the roll rate crisp and responsive.

(I used the instructions' suggested control throws.) With fully symmetrical airfoils, the wings work equally well upright and inverted; either way, the model requires very little elevator trim to fly straight and level. At full throttle, vertical performance is brisk. Stall behavior is good; the model slows quickly and breaks straight ahead every time if the wings are level. The Pitts is a delight to fly, and though not intended for beginners, it is well behaved.

AEROBATICS

As soon as you get the model to a safe altitude, there's an irresistible urge to have fun; hey, we're talking about a giant-scale Pitts Special here! First I tried a straight aileron roll—wow!; nice and axial. Then a little inverted flight. Almost no forward stick required for level flight. OK; what about a 4-point roll? The rudder has great yaw authority, and the stubby fuselage helps retain some lift. Snap roll? In a heartbeat! To get it just right, however, you do need to lead a little with up-elevator and hold off on aileron input. Full rudder does the trick! My first snap ended up as a snap-and-a-quarter! All in all, this is a very exciting jitterbug of a model. As we all know, the sky's the limit with a Pitts!

Above: I used a mighty Megatron two-handle electric starter from Sullivan to crank the Fuji to life! It's the best starter I have ever used for big engines! Right: the cabane struts come already bent to shape and painted. Even the attachment-screw holes have already been drilled for you—no guesswork required!

printed vinyl; simply stick them on and rub them smooth. The kit does come with steel cable and clevises to make non-functional flying wires, but I used thin, plastic craft lace to replicate flat, chromed flying wires (see Nick Ziroli's "How To" article in the April 2002 issue for more details).

With everything installed, my model came out at exactly 17 pounds, 1 ounce, ready to fly, and it balanced exactly on the forward CG (5 inches back from the top wing's leading edge) without any additional ballast. I used the recommended control-throw settings and the model flew very nicely.

Throw values:

- Elevator: 15⁄8 inches up and down (high rate); 1 inch up and down (low rate).
- Rudder: 2½ inches left and right (high rate); 1½ inches left and right (low rate).
- Upper ailerons: 1⅛ inches up and down (high rate); ⅝ inch (low rate).
- Lower ailerons: 1 inch up and down (high rate); ½ inch up and down (low rate).

The ⅓-scale Pitts Special ARF is one of the nicest models I have ever built and flown, and when powered with the Fuji 50cc gasoline engine, it has awesome flight performance. If you are looking for a new IMAA-legal biplane or a great sport-scale competition ship, or if you just want a new eye-opener for the local flying field, this biplane is it! Upright or inverted, climbing vertically or coming in for a smooth landing, this Pitts Special makes it all look easy!

BRAIN-SCRAMBLER PAR EXCELLENCE!

Photos & sidebar by Budd Davisson

OK; let's get one thing absolutely clear: the Pitts Special is not—repeat *not*—just an airplane. I know some people think that it is, but ask any long-time Pitts drivers, and we'll all tell you that there are airplanes and there are Pitts Specials, and the two shouldn't be confused.

There's a reason for the statements above—actually, a bunch of reasons, but the one on the top of the list is that the Pitts does something only very few airplanes are capable of doing: they reach inside you and change your entire outlook on life, and in so doing, make you something you weren't before. In that regard, the Pitts is more of a lifestyle than a machine. More of an attitude than an airplane. More a spiritual way of being than a piece of transportation.

Yeah, I know, this sounds pretty sophomoric. At least, it will read that way to all non-Pitts pilots. But Pitts freaks are nodding their heads and grinning. They know what I'm talking about.

It has often been asked whether Curtiss Pitts, a self-taught engineer and welding inspector in an airframe plant, really knew what he was doing when he designed and flew his first "special" in 1945. The reality is that it doesn't matter. The airplane is what it is, and Curtiss, a self-proclaimed "redneck engineer" of the old school, designed it around what he knew at the time, and it came out nearly perfect.

Although he wasn't an engineer, he knew what he *didn't* want in his little airplane because he had flown enough other airplanes—WACOs, Great Lakes, Stearmans—to know that when it came to aerobatics, they weren't it. They were big and stodgy—slow to react and, although loaded with horsepower, slow to climb and quick to descend.

Pitts knew that to eliminate "slow" from his airplane's repertoire, it had to be compact. Long wings don't roll quickly. Also, he wanted strength without size, and that meant the trusty biplane configuration. He also wanted lightness, and the biplane configuration helped him there, too. The final airplane—designated "Special One," S-1—that flew in '45 is virtually identical to the hairy-chested, single-hole Pitts that have been airshow and aerobatics staples for 40 years, although some of their significant details differ.

Modern Pitts pilots find it difficult to believe that the original airplane had only 55hp, and it only had ailerons in the lower wings—something that didn't change until the S-1D and then S-1S introduced four ailerons in the late 1960s. The gear was rigid and depended on odd little 700x4 tires to absorb landing shocks. The turtle deck was also different: it was built up with stringers and had a headrest instead of being a continuous aluminum curve.

Now, flash ahead 55 years, and 180hp is the standard, 250hp isn't uncommon, and the airplane comes with an automatic adrenaline pump attached to the throttle: move the throttle quickly and you feel the adrenaline pooling in your boots.

A side effect of your first takeoff in a 180hp single-place Pitts is that it takes three days for your facial muscles to stop hurting after the long grin. After your first landing, it's two hours before you can whistle because your mouth is so dried out. Everything happens quickly in a Pitts—everything; and to the pilot who's schooled in "normal" airplanes, it sometimes comes as a major shock. More than one Pitts has been rolled up into a compact ball on its first landing when its pilot suddenly discovered he was flying an airplane that does exactly what he tells it to do the second he tells it to do it. The problem is that "normal" pilots often don't think more than one move ahead, so when they make that move and the airplane reacts that quickly, they suddenly find themselves one move behind the airplane when the goal is to always be two moves ahead of it.

The airplane is like the sharpest scalpel in history and allows you to make paper-thin changes in your flight profile. To do fine work, you need the sharpest tools. The downside to a sharp tool, however, is that a mistake is usually a big one. And so it is with the Pitts. It will let you thread a needle in any situation, but it is an airplane for pilots with specific goals. An "approximate" pilot will find the airplane chasing his butt all over the airport.

Once you've made friends with a Pitts, you find you not only truly have control of yourself, but, in the process, are also totally aware of what an achievement that can be. And you feel good about it. There's a reason people don't point out the Cherokee pilots at an airport. There's also a reason everyone know who flies a Pitts. Got the message?

Editor's note: Budd Davisson, editor-in-chief of our sister publication Flight Journal, *has been a certified flight instructor for 35 years, specializing in teaching Pitts Special landings. He has also logged more than 6,000 hours as a pilot and has flown nearly 300 types of aircraft, including many WW II fighters.*

Great Planes Model Distributors Co. *(800) 682-8948; greatplanes.com.*
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Model Graphics *(409) 787-2875.*
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Weston U.K.

MAGNU

PHOTOS BY WALTER SIDAS

Almost-ready-to-fly mach-speed sportster

by Jim Onorato

The Weston U.K. Magnum is an almost-ready-to-fly sport plane that's said to be capable of flying faster than 200mph! Constructed of balsa, foam, lite-ply and fiberglass, it is almost completely built for you and covered in yellow film trimmed with black film that has a simulated carbon-fiber finish. The anhedral of its elevator and the wing's swept-back leading edge give it a sleek, jet-like appearance.

SPECIFICATIONS

MODEL: Magnum

MANUFACTURER: Weston U.K.

DISTRIBUTOR: Modellbau USA

TYPE: .40-size sport ARF

WINGSPAN: 34.4 in.

WING AREA: 332 sq. in.

WEIGHT: 4 lb.

WING LOADING: 27.8 oz./sq. ft.

LENGTH: 42.1 in.

RADIO REQ'D: 4-channel w/3 servos (*throttle, elevator and aileron*)

RADIO USED: JR XP8103 transmitter, NER 549X receiver and 3 NES 537 servos

ENGINE REQ'D: .40 to .50 2-stroke

ENGINE USED: West Eurotech .50v1 w/Genesis tuned pipe and manifold

PROP USED: 9x7 APC

FUEL USED: 15% Prosynth 2000 (soon to be distributed by Wildcat Fuel)

PRICE: $120 (kit); $315 (kit w/engine manifold and pipe)

FEATURES: one-piece, sheeted-foam wing; built-up lite-ply, balsa and fiberglass fuselage; sheet-balsa tail feathers; covered with yellow film trimmed with black film and simulated carbon-fiber finish; complete hardware package.

COMMENTS: the Magnum is a magnificent-looking airplane intended for the experienced flier. It has reportedly attained speeds in excess of 200mph and would make a great turbine trainer for an AMA waiver.

HITS

- Excellent flight performance.
- Terrific overall appearance.
- Ease of assembly.

MISSES

- None.

My Magnum was able to reach a speed of nearly 125mph—not quite the 200mph that was advertised, but certainly fast enough for my taste!

Here's what I found when I opened the box. Check out that striking trim scheme. If you think it's appealing now, you should see it as it streaks across the sky.

WHAT'S IN THE BOX?

My first impression of the Magnum was that it's a great-looking plane with a very striking appearance; I couldn't wait to assemble it. Even the box art was impressive.

Though the Magnum is available separately, Modellbau USA also offers it in a combination package with the recommended West Eurotech .50v1 engine, Genesis tuned pipe and manifold. The Magnum I reviewed included the power system.

The Magnum has only five major parts: the fuselage, wing, tail fin and two stabilizer halves. The package also includes various accessory packs that contain all of the necessary hardware, pushrods, fuel tank, engine mount and decals. An 8-page manual provides all the instructions necessary to complete the aircraft. Because the Magnum was meant to be hand-launched, it does not come with landing gear or wheels. The instruction manual includes information on how to add landing gear if desired, but Weston U.K. does not recommend this.

The included West Eurotech engine with Genesis tuned pipe makes one amazing power system. It produces in excess of 2.8bhp at 21,500rpm—enough to turn the Magnum into little more than a blur in the sky.

ASSEMBLY

The Magnum's one-piece, balsa-sheeted foam wing has a very thin, high-speed, laminar-flow airfoil. It has no dihedral and at its thickest point measures only 5/8 inch. The torque rods for the strip ailerons and the fuselage belly pan come already attached, so to finish the wing, I had only to attach the aileron hinges with thin CA and install the aileron servo mount, the servo and pushrods. I also replaced the 3mm wing bolts with 6-32 capscrews and blind nuts.

The construction of the Magnum's fuselage is unique. The sides and formers are made of lite-ply, the bottom is balsa, and the top is molded fiberglass. The top edges of the sides are cut to accept the fiberglass top so that the outside surface remains perfectly smooth. Yellow film with black trim covers the entire fuselage. The black-film-covered canopy is an integral part of the fiberglass fuselage top. The lite-ply sides were fairly thin, so I added 1/4-inch balsa to the wing saddle to give it a little more bearing surface.

Although the instructions called for the engine and fuel tank to be installed next, I saved that for later and jumped ahead to install the tail feathers. The Magnum does not have a controllable rudder—just a fin. The fin, stab and elevators are all made of 3/16-inch sheet balsa. After I had removed the covering from the areas to be glued, I epoxied the vertical fin into place with 30-minute epoxy. The stab comes in two halves that must be glued together. The anhedral is already built in, so I simply epoxied the halves together using the provided jigs to maintain the proper angle. When the epoxy had fully cured, I removed the covering from the slots in the fuselage and epoxied the stab into place. I then installed the elevators and glued the hinges into place with thin CA. The slots for the tail feathers were cut so precisely that everything lined up perfectly without any cutting or shimming.

Next, I glued in the elevator and throttle servo trays. I mounted the elevator servo on

FLIGHT PERFORMANCE

The instructions call for elevator throws of only 10mm up and down and aileron throws of only 8mm up and down. I set these throws as my high rate and used a low rate that was 75 percent of that. For my initial flights, I set the elevator to high and the aileron to low.

The Magnum was designed to be hand-launched, but I was a bit nervous about doing so for the first few flights. Because the model did not have landing gear, I decided to build a simple 3-wheel takeoff dolly to get the Magnum airborne. I set up the dolly so that the Magnum was at a 5-degree angle of attack for takeoff.

TAKEOFF AND LANDING

After I had filled the tank with the recommended Prosynth 2000 fuel, I tuned the engine so that it came up on the pipe at full throttle, aimed the Magnum into the wind and throttled up for takeoff. The plane and dolly accelerated quickly, and after traveling about 75 feet, the Magnum left the dolly behind and rose briskly into the air. The engine's torque caused the plane to veer sharply to the left, and a quick touch of right aileron was required to straighten it out. Before I knew it, the Magnum was several hundred feet high!

Having seen the tremendous thrust provided by the West Eurotech engine, I decided that hand-launching would be fairly easy, so I used that technique for subsequent flights. The instructions say that the Magnum can be hand-launched by the pilot with one hand, but I found that the flexibility of the turtle deck and the proximity of the hot tuned pipe made that a little hairy. Instead, I had someone else hand-launch it by holding the fuselage just in front of the tail with one hand and the tip of the wing with the other. With an underhand motion, the Magnum can easily be hand-launched safely.

The Magnum glides very well, so deadstick landings are a breeze. I set up a rather long approach and killed the engine just before the plane reached the threshold of the grass runway. Then I just let it settle in for a smooth belly landing, without flaring.

LOW-SPEED PERFORMANCE

It flies quite well at low speed, but don't expect it to fly like a Cub. I found it to be stable and responsive with no bad tendencies or surprises.

HIGH-SPEED PERFORMANCE

The Magnum was built for speed, and it does not disappoint! It is by far the fastest airplane I have ever flown. Although I did not get it up to 200mph as others have reportedly done, I did clock it at 124.8mph—fast enough for me! I'm not sure I could stay with it at 200mph! I have no doubt that with the recommended 8x8 APC prop for optimum performance and the pipe tuned properly, the Magnum could reach 200mph, as advertised.

AEROBATICS

The Magnum likes fast, sweeping maneuvers. It does huge round loops and rolls so fast, it is hard to count the revolutions. But, hey; you don't buy the Magnum for its aerobatic capabilities.

Installing the radio gear was fairly straightforward and took no time at all. There's plenty of room in the fuselage, which is always a plus, and Weston provided servo trays that simply had to be glued into place—another timesaver.

the tray just behind the wing's trailing edge and secured the throttle servo just ahead of the wing hold-down plate. The tubes for the pushrods were already installed. Each elevator half has its own plastic pushrod; I connected the two at the servo end with the provided fittings. Metal rods connect the plastic pushrods to the elevator control horns. I inserted the untrhreaded rod ends into the pushrods and then threaded the threaded portion of the rod into the pushrods. The throttle pushrod is a solid wire.

ENGINE AND RADIO INSTALLATION

The included West Eurotech .50v1 ABN 2-stroke engine with a tuned pipe and manifold produces more than 2.8bhp at 21,500rpm! In addition to being an awesome powerplant, this engine looks really neat; it has a violet-colored anodized head, carburetor and thrust washer.

The Magnum comes with a composite engine mount that I mounted on the firewall. I then installed the engine, manifold and tuned pipe. I used a piece of silicone tubing to attach the pipe to the manifold and then mounted the assembly on the side of the fuselage with the supplied mount and tie-wrap. I used a 9x7 APC propeller and a 2-inch aluminum spinner.

Next, I mounted the receiver battery on the balsa sheeting in front of the wing-mounting plate, being careful not to interfere with the aileron pushrods. I wrapped the receiver in foam, placed it behind the balsa sheeting, and slid it back toward the plane's rear. I then routed the antenna through the already installed antenna tube and out the tail end of the plane. I mounted the switch harness on the side of the fuselage opposite the pipe and close to the receiver. The CG came out to be 4¾ inches behind the wing root—right where it was supposed to be. Last, I applied the decals.

CONCLUSION

The Magnum is a magnificent-looking airplane that goes together quickly and flies like a bullet. It is certainly not intended for the faint of heart and is sure to give any experienced RC pilot the ride of his life. If you have a need for speed, this is just the plane for you.

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.
JR; distributed by Horizon Hobby (800) 338-4639; horizonhobby.com.
***Weston U.K.**; distributed by Modellbau USA (954) 476-5572; modellbau-usa.com.*
***Wildcat Fuels** (888) 815-7575; wildcatfuel.com.*

Sig Mfg.

SU-31 SUKHOI

Easy-build, sport-scale aerobat

PHOTOS BY JOHN REID

by John Reid

The Sig name has always been synonymous with high-quality, well-engineered kits, so on opening the Sig Sukhoi Su-31 ARF, it came as no surprise to find a top-quality balsa and plywood plane expertly covered in Ultracote. The kit includes a fuel tank, Sig Double X hinges for all the control surfaces, a complete tailwheel assembly, aluminum main landing gear with steel axles, wheels, a plastic-molded painted canopy, decals, a fiberglass cowl and all the required control-system hardware.

SPECIFICATIONS

MODEL: Sukhoi SU-31

MANUFACTURER: Sig Mfg. Co. Inc.

TYPE: sport-scale aerobatic ARF

WINGSPAN: 76¾ in.

WING AREA: 1,152 sq. in.

WEIGHT: 14 lb., 10 oz.

WING LOADING: 29.25 oz./sq. ft.

LENGTH: 66.9 in.

ENGINE REQ'D: 1.50 to 2.10 2-stroke or 1.80 to 2.70 4-stroke or 2.40 gas

ENGINE USED: Magnum XL 1.80 2-stroke

RADIO REQ'D: 4-channel w/6 servos (throttle, rudder, 2 elevator and 2 aileron)

RADIO USED: Airtronics RD6000 with 6 Airtronics 94731 servos

FUEL USED: Powermaster 15%

PROP USED: Zinger 18x6

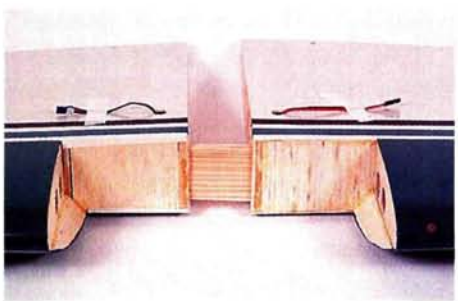
PRICE: $429.95

FEATURES: balsa and plywood airframe covered with Oracover in a three-color paint scheme; well-made fiberglass cowl; complete hardware package includes pushrods, tank, wheels, hinges and a fully detailed assembly manual.

COMMENTS: the Sukhoi is a well-designed and quick building ARF. Its light structure and great-looking color scheme make it a very attractive plane, both in the air and on the ground. The real joy is when the plane flies; it beautifully performs any aerobatic maneuver you can imagine and is extremely stable on landings.

HITS
- Excellent assembly manual.
- Well-engineered and constructed.
- Superb parts fit.
- Generous hardware package.

MISSES
- Weak wing bolts.
- Foam wheels are easily flattened.



Be sure to test-fit the plywood former in the wings before you apply the epoxy. It is important to get a strong joint here; the strength of your wing depends on it.

This is what I found when I opened the box. All of the pieces were well constructed and of the highest quality—two things I've come to expect from products that bear the Sig name.

A photo-illustrated, well-written assembly manual details the assembly process, from opening the box to the first flight. It includes helpful hints and lists of tools and other supplies needed to complete the project.

ON THE WORKBENCH

Wing assembly. I first checked the fit of the two wing panels to determine whether they required any trimming or adjustment; the wing roots matched perfectly.

I used Airtronics 94731 heavy-duty, ball-bearing servos for the ailerons and elevators. I used heat-shrink tubing to attach 12-inch servo extensions to each of the aileron servos and then routed the extensions to the wing root. To prevent them from slipping back into the wing, I secured the extensions with a piece of tape.

All of the control surfaces are beveled to allow more than 40 degrees of movement for extreme 3D maneuvers, and the included Sig Double X heavy-duty nylon hinges ensure that the surfaces can take the stress of these maneuvers. I sanded each hinge surface with an emery board before I applied epoxy to it. Please note that as you push the hinges into the slots, the epoxy will squeeze out onto the joint, so you'll need to first cover the joints with petroleum jelly to keep the epoxy out. These hinges provide a very solid and secure control surface.

I then applied 30-minute epoxy to the wing roots and taped the wings together with masking tape. To maintain pressure on the wing roots and create a secure bond, I stood the wing upright on one of the wingtips and added weight to the other. I then set the wing aside to dry.

I next test-fit the wing to the body and found it to be a perfect fit—nice engineering! But I encountered a problem when I tried to screw the 5x8x38mm nylon wing bolts into the metal blind nuts already installed in the fuselage: the blind nuts stripped the bolts. This was just as well for me, as I did not like using such small nylon bolts on a plane of this size. Because I did not want to drill larger holes in the wing, I used ¼-20 bolts that I purchased at the local hardware store. They fit the existing holes perfectly and really strengthened the whole wing assembly.

The instructions for the remainder of the wing assembly are very clear, and after I had installed the pushrods from each servo to the ailerons, I was ready to move on to the fuselage.

Fuselage. I started by installing the main and tailwheel assemblies. The directions were easy to follow, and before I knew it, the body was standing on three sturdy gears. The included wheels were made from a foam-like material, and after a while, the tailwheel went flat. The weight of the plane also caused small flat spots to develop on the main wheels. Because this could cause control problems while taxiing, I decided to replace them with low-bounce rubber wheels.

Sig includes instructions for both 2- and 4-stroke engines, and there is enough room under the cowl to install just about any engine that falls within the recommended size range. I chose a Magnum 1.80 2-stroke engine for power and used muffler adapters to extend the bulk of the stock muffler outside of the cowl so that I wouldn't have to cut it up as much. A Pitts-style muffler would really clean up the cowl's external appearance.

I installed the provided fuel tank and mounted the cowl the proper distance from the back of the prop. I then made sure to cut adequate openings in the bottom of the cowl to allow for proper airflow and keep everything cool. After I had installed the 18x6 prop and a 3¾-inch spinner, it was time to move on to the tail feathers.

Tailpieces. The first step in assembling the tail feathers is to remove the covering from where the stab and fin attach to the fuselage. Before you glue them into place, be sure to measure everything carefully,

FLIGHT PERFORMANCE

Flying the Sukhoi is the best part of owning it. If you follow the instructions to a T, the first flight requires very little trimming. Designed to perform well in the air, the Sukhoi responds graciously to my commands, with a little persuasion on the sticks.

TAKEOFF AND LANDING

The Sukhoi tracks straight down the runway and needs very little rudder to maintain that heading. The tail comes up quickly, and with a touch of up-elevator, the Sukhoi is usually in the air before I'm ready. I maintain a shallow angle until the plane gains some altitude, and this is when I start my turn. The Sukhoi requires just a little right trim to fly straight and level hands off, and it shows no tendency to stall on slow-speed passes.

Landing the Sukhoi is very easy; I gradually cut back on the throttle during my base leg and reduce it to an idle on final. The Sukhoi settles into a gentle glide path with a good rate of descent. Just as the wheels are ready to touch the ground, I slowly apply some elevator to flare the plane, and it floats into a smooth 3-point landing. I've learned to always let the Sukhoi float down for a smooth and soft landing. One time, I landed a bit too hard. The large landing gear acted like a giant spring and launched the plane straight up into the air!

LOW-SPEED PERFORMANCE

The Sukhoi is very predictable at low speed, and all of the controls remain effective. When the flying is bled off, the Sukhoi settles into a fairly sedate stall. To recover, release the up-elevator and let the nose drop. As the Sukhoi regains airspeed, it will again start flying.

HIGH-SPEED PERFORMANCE

At full speed, the Sukhoi moves along at a pretty good clip, and the Magnum 1.80 supplies ample power to pull the plane through most high-speed maneuvers. The controls are very responsive, but not overly sensitive, and produce very smooth flight characteristics.

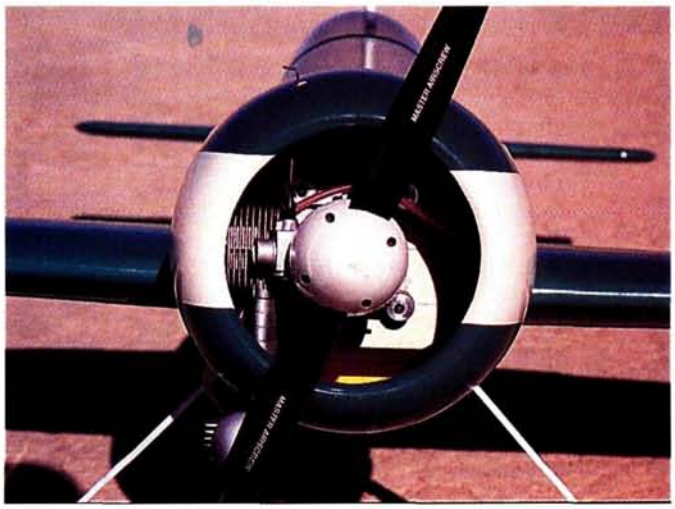
AEROBATICS

Aerobatic flight is what the Sukhoi was designed to do, and it does it well. Rolls are crisp and quick, even at low rates. This plane rolls very smoothly and requires very little input from the elevator and rudder. The Sukhoi pulls through loops cleanly, with little or no wandering to either side. When inverted, the plane requires a minimal amount of elevator to maintain level flight. I can maintain level-flight knife-edges from one end of the field to the other with just a little rudder and up-elevator. Snap rolls are fast, crisp and beautiful. I have to be quick on the sticks to stop the rotation before beginning another roll.

Though the Magnum 1.80 is not powerful enough to perform hovering maneuvers, these could easily be achieved with the use of an engine at the higher end of the recommended range. With the proper engine and weight ratio, the Sukhoi could perform any aerobatic maneuver imaginable. This is a wonderful plane to learn aerobatics on; it responds quickly and with great precision yet remains extremely stable in the air. Don't consider this plane to be merely a stunt flyer. The Sukhoi is a remarkable all-around aerobatic/pattern/trainer plane.

and if possible, use an incidence meter to ensure an accurate alignment. It is much easier to prepare the stab and fin for the hinges before you attach them to the fuselage. I glued the hinges into the elevators and rudder at this time, but I did not glue them into the stab and fin until after I had attached them to the body.

Next, I glued the stab and fin to the fuselage. The directions are very concise and well written and will guide you easily through this process. I used slow-drying epoxy so that I could recheck my measurements a few times before it set. By the time the glue was dry, I was sure that everything lined up perfectly. After I glued the hinged surfaces into the stab and fin, I installed the three Airtronics (94731) servos.



Even though I used a large Magnum 1.80 engine, there is still plenty of room inside the cowl. Just about any engine that falls within the recommended size range will easily fit here.

Because each elevator half has its own servo, I used a servo-reversing Y-harness. This Y-harness electronically reverses one of the elevator servos to create a mirror image of the other. It also has a centering adjustment that lets you dial in one half of the elevator to match the other exactly. Instead of each servo moving in the opposite direction (like the ailerons), each servo now moves in the same direction (like flaps). This adapter makes it very easy to synchronize the servos, and if you don't own a computer radio, it's a good device to have.

Radio installation. Because there is so much room in the fuselage, installing the radio gear was very easy. I wrapped the receiver in foam and used rubber bands to secure it in the fuselage. An internal receiver-antenna exit tube comes already installed in the Sukhoi's fuselage, and a clear-plastic tube runs along the full length of the body. I simply slid the antenna through this tube.

Next, I wrapped the receiver battery in foam and inserted it into a plastic bag. Because the battery is the heaviest thing in the plane, I moved it to the very front of the fuselage to help balance the model. I used a Du-Bro Kwik Switch and Charging Jack to mount the receiver switch on the side of the fuselage.

After I had centered all the servos, I set

the controls to the suggested throws and installed a short length of fuel tubing on all of the clevises to prevent them from becoming disconnected from the control horns.

Odds and ends. The next step was to affix the decals, and this can sometimes be tricky. The assembly manual recommends that you spray a mixture of soap and water on the plane before you apply the decals. Though this works well, I prefer to immerse the decals in a tub full of soapy water before I place them on the model. This allows me plenty of time for adjustments. When I was satisfied with their placement, I used a foam paint bush to squeegee the excess soapy water out from under the decal and mopped it up with a dry cloth.

Following the instructions, I attached the canopy with the six supplied 4-40 nylon bolts, which held it securely in place. After several flights, however, several bolts fell out. To prevent this from happening again, I simply coated the threads with some silicon seal. I suggest that you do the same.

Last, I carefully balanced out the Sukhoi, and then I was ready to hit the flying field.

CONCLUSION

The Sukhoi is a very well-designed and well-built plane. Sig really did a fine job on this kit. In addition to being an impressive presence at the flying field, the Sig Sukhoi is an easy-to-fly plane that's capable of just about any maneuver possible. If these are your requirements, then this is the plane for you.

Airtronics (714) 978-1895; airtronics.net.

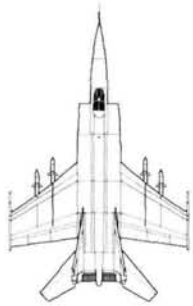
Du-Bro (800) 848-9411; dubro.com.

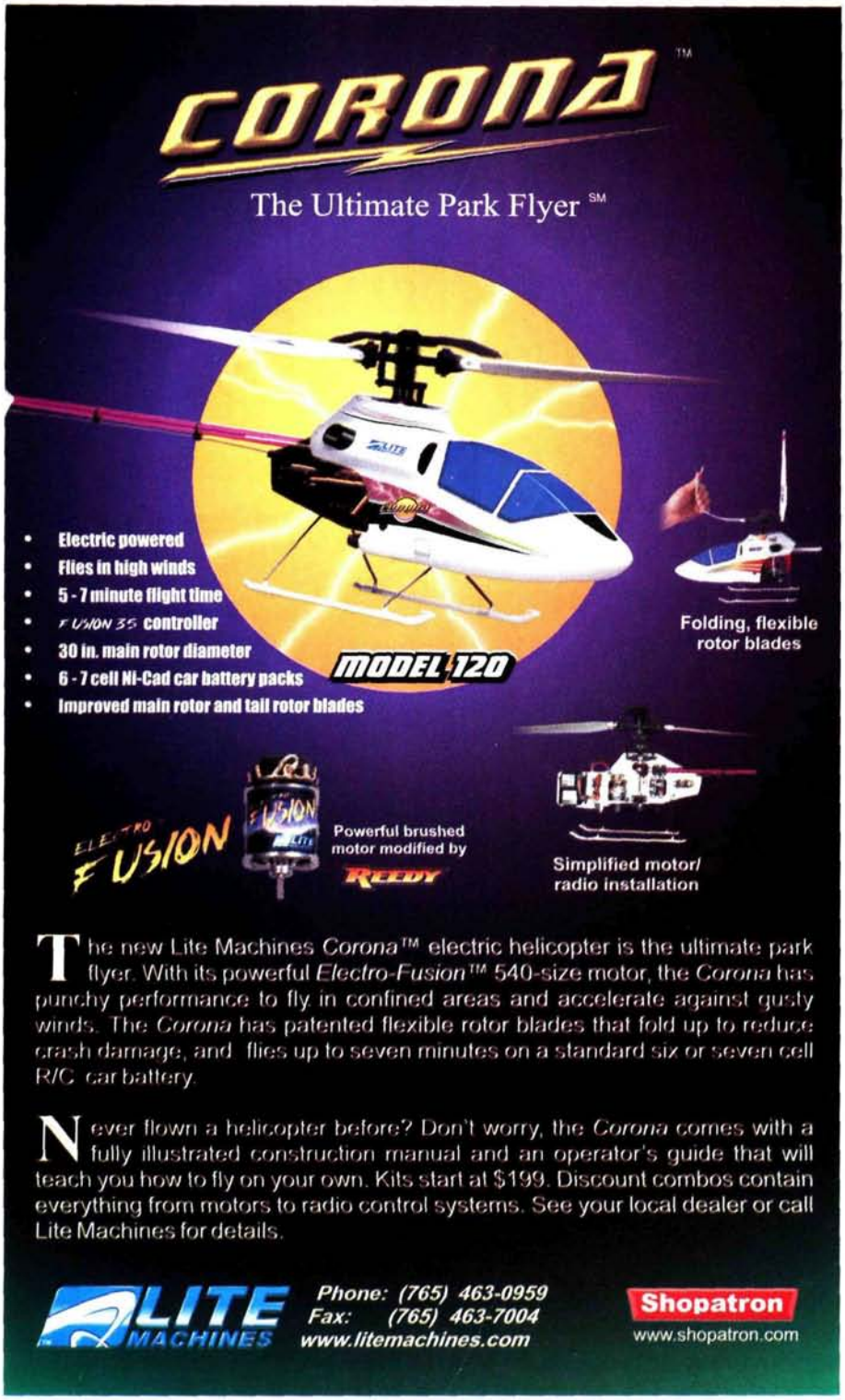
Magnum; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.

Powermaster (512) 285-9595; powermasterfuels.com.

Sig Mfg. (800) 247-5008; sigmfg.com.

Zinger; distributed by J&Z Products (310) 539-2313; zingerpropeller.com.





FunAero R/C 1/4-scale S.E.5a

The dawn patrol lives on!

by George Leu

WW I designs are at an all-time high in popularity, and there are many great kits to choose from. I like the way the "older" models look and fly, and the FunAero R/C 1/4-scale S.E.5a was one of those that caught my eye. This stand-off-scale model has all the appeal of a full competition scale model but is a lot easier to build. FunAero uses the latest design and manufacturing technology to produce its kits, and that's obvious when you open the kit's box. Let's take a closer look.

KIT CONTENTS

The S.E.5a box is filled with many beautifully produced wooden parts and hardware. The kit includes a 40-page instruction booklet with building photographs that take you step by step through the model's construction. Also included is a materials list (with a description of all the laser-cut parts), wooden sticks, bag of precut wood, Du-Bro hardware pack, precut brass tubes, landing-gear hardware and an excellent set of CAD plans. Williams Bros. wheels and a pilot, along with wooden machine-gun kits, filled every inch of the well-packed box. I was impressed.

The laser-cut balsa and plywood parts are excellent, and they just fell out of their carrier sheets when I needed them. Some of the plywood parts showed signs of a very light sap residue, but it was easy to sand off and did not slow down the building process. The hardwood and balsa sheets are lettered and numbered, so they are easy to identify; this may not seem like a big deal, but with all the wood included in this kit, it helps you save a lot of time looking for parts.

CONSTRUCTION

I built the model according to the plan and manual and started with the wing. Each wing is built in three pieces: two outer panels and a center section. The

outer panels can be removed from the center sections for ease of transportation and storage; I really like this feature. The two lower ailerons are individually controlled by a servo, and slave pushrods drive the upper ailerons. The wings have many parts, but the laser-cutting makes assembly easy. All the pieces went together without needing any sanding, cutting, or bending. The lite-ply wingtips, ribs and short ribs went together quickly and according to the instructions. If you use the plywood rib-setting guide, you're assured of accurate rib spacing and the correct angle for the spars. The rib guide is a neat idea and a great addition to the kit.

Fuselage construction, like the wings', goes along quickly and easily. It's built of balsa sticks, formers and lite-ply. The engine compartment is unique. From forward of the cabane struts and including the radiator, the top of the fuselage can be entirely lifted off to allow total engine access. Just about any engine in the recommended range will fit completely in the model's nose.

As directed, I built the two fuselage sides on top of each other. This ensured that both sides would exactly fit the other's bulkhead and former bracing. When I pulled the fuselage sides together (step 31), I used the lower edge of the top 3/8-inch-square longeron as a reference

PHOTOS BY WALTER SIDAS & GEORGE LEU

SPECIFICATIONS

MODEL: ¼-scale S.E.5a

MANUFACTURER: FunAero R/C

TYPE: sport-scale WW I biplane

WINGSPAN: 80 in.

TOTAL WING AREA: 2,400 sq. in.

LENGTH: 66 in.

WEIGHT: 22 lb.

WING LOADING: 21.12 oz./sq. ft.

ENGINE REQ'D: 1.50 to 1.80 4-stroke, or 35 to 45cc gasoline

ENGINE USED: Zenoah G-38

RADIO REQ'D: 4-channel w/6 servos

RADIO USED: Futaba 9C w/5 Tower Hobbies System 2000 servos (ailerons, elevators and rudder) and one Futaba S148 servo (throttle)

PROP: Zinger 20x8

STREET PRICES: $399.95; $439.95 (deluxe)

FEATURES: laser-cut balsa and lite-ply parts; CAD plan; complete hardware package that includes Robart Super Horns, hinges and Du-Bro pull/pull system; photo-illustrated construction manual; removable cowl; spring-loaded landing gear; Williams Bros. accessory pack available.

COMMENTS: the FunAero ¼-scale S.E.5a is a beautifully engineered kit that can be built quickly and accurately. The model's outlines are very true to scale, and with a little detailing effort, you can have a model that would be competitive on the scale circuit.

HITS

- Excellent laser-cut parts.
- Easy to build.
- Top-quality hardware.
- Gentle flight characteristics.

MISSES

- Wing design on early version.

SCALE ENHANCEMENTS

I built my S.E.5a exactly according to the instruction manual; it's designed as a sport-scale aircraft, but I wanted a few minor additions to enhance its looks. Everything I did is cosmetic and easy to do; any modeler who's willing to spend a little time on this will achieve excellent results. Here's what I did and how I did it.

Above left: which WW I plane would be complete without some dirt and grime? Getting the effect is easy; I used wood stain that I applied with an old T-shirt. Just don't overdo it! Above right: I used Nelson Hobby Specialties System Three water-based paint for outstanding results. These paints go on easily, are odorless and can be cleaned up with water. The available colors matched my documentation very well. Below: the characteristic stitching on the S.E.5a's fuselage is easy to replicate using carpet thread. Just lay out the pattern required and snake the thread into place. A few coats of clear dope secure the thread on the fuselage.

- The Royal Aircraft Factory wrapped strips of cloth around the cabane struts to ensure that the wood did not split. To achieve the effect of cloth-wrapped wood, I cut ColorFAB into ¼-inch-wide strips that I wrapped around the cabane struts. It looks very convincing.

- I obtained several plastic parts, such as the sump fairings for the top wing, the windshield and small hatches for the fuselage, from Top Gun competitor Mike Gross. They are available from Nick Ziroli Models at a minimum cost and add that finished look.

Many WW I planes have stitching on the fuselage, and the S.E.5a is no exception; I used carpet thread for this. I first inserted pins into my covered fuselage at ¼-inch intervals in an alternating pattern. I strung the thread around the pins and then applied three coats of clear dope to stick the thread to the fuselage. I then removed the pins, and the stitching was ready for paint; it's a great attention-getter.

- If you've ever looked at full-scale WW I planes, you've noticed that they are pretty dirty, so I decided to weather the S.E.5a, especially the bottom. To get the look I wanted, I use a dark wood stain. I dip an old T-shirt into the stain. I like to use the sediment at the bottom of the can, and then—from front to rear—I add streaks that look as if passing air has blown oil and dirt backward. Before the stain has a chance to dry, I wipe thinner over the stain to soften the effect. Be sure to do this in a well-ventilated area.

The rudder and elevators use a scale-like pull/pull system for positive control; the cables are supplied.

centerline. This gave me a perfectly straight fuselage, and I was able to attach the parts that fit in the rear of the fuselage without any cutting or sanding. It really reflects the quality of this kit's engineering.

On most biplanes, the cabane struts are difficult to build, but not on this one. I followed the directions and didn't have any problems. When you solder the joints, the instructions have you use fuel tubing to hold the bracing wire and mounting lugs together to ensure the correct alignment—a clever idea. I covered the cabane struts with wood after I had set the 11-inch spacing for the blind nuts in the wing center section.

The radiator looked as though it might be complicated to assemble, but it wasn't difficult at all. The parts are cut so accurately that they slide into their respective slots without any need to cut or sand them. On the finished model, the radiator looks positively awesome; it really makes the plane come alive.

The horizontal stabilizer, elevators, vertical fin and rudder follow standard construction techniques and use a combination of laser-cut parts and balsa sticks. When I had built them, I weighted the structures down on a flat board until I was ready to install them. I did this just in case the glue needed extra time to dry and to prevent the structures from warping.

Having finished the construction, I assembled the S.E.5a for the first time, and

FLIGHT PERFORMANCE

The FunAero R/C S.E.5a is a big biplane, but because of its lightweight construction and ample wing area, it has a relatively light wing loading. Because of this, a Zenoah G-38 turning a Zinger 20x8 prop has more than enough oomph to power it.

TAKEOFF AND SLOW FLIGHT

With its steerable tailskid, the model's ground handling is very good, and it doesn't have a tendency to nose over. Given a moderate headwind, the S.E.5a literally levitates off the ground when you advance the throttle. Keep it pointing into the wind as it gains altitude, and use rudder and ailerons to coordinate your turns. Once you've established a safe traffic-pattern altitude, pull back the throttle to about ½, and trim the model for straight and level flight.

GENERAL FLIGHT PERFORMANCE

With the throttle reduced, the model feels very stable and undemanding as you cruise at ½ to ¾ throttle. With all the control throws set as recommended, roll rate (with four ailerons) is positive but not overly sensitive. Elevator response is good, and pitch control is very comfortable, even at full throttle. Steep banking angles (near 45 degrees) are fun, and the model has plenty of control authority. You can easily get into and out of any maneuver you perform. From loops and barrel rolls to stall turns and spins, the S.E.5a can do it all in very scale-like fashion. We're talking about a lightly loaded WW I biplane and not a red-hot aerobatic design, so adjust the throttle accordingly. Use power to climb, and reduce throttle when you point the nose toward the ground.

DURABILITY TEST

Unfortunately, I cannot report on the model's landing characteristics, but it's a given that this type of model is not demanding. When it comes to getting it back on the ground, its two big wings, flat-bottom airfoil and large propeller disc all but guarantee a well-behaved arrival, as long as you land into the wind and keep those crosswind landings to a minimum.

Just as I brought the model into the downwind leg of the landing pattern, I heard a very loud snap/bang, and the model abruptly rolled into a left knife-edge bank! It then nosed up steeply and stalled, after which it headed straight for the ground. I reduced the power and tried to regain control, but the model again rolled over—this time into inverted flight. Obviously, something had broken, and the model wasn't responsive in roll! Using rudder, elevator and throttle, I eventually leveled the wings, but by then, the model was at the far end of the flying field and diving behind a stand of trees! The model hit the ground very hard, and I turned the radio off and quietly walked to the crash site. Oh, I hate it when that happens to someone else's airplane!

I was amazed how little damage the model had sustained. It was resting on its top wing and the top of its vertical fin. From the condition of the undercarriage, it was obvious that the wheels and struts had taken the brunt of the impact. All the wooden fairing pieces had broken off, the solder joints on one side had broken, and the tops of both struts had been ripped off the bottom wing. The right top and bottom wing panels had broken away from their center sections and were held on by only the scale rigging wires. This had happened in midair and was why the model had become uncontrollable. Besides a few other dents and tears, it was amazingly intact considering the severity of the crash.

A close examination of the broken wing-spar joiners revealed that both had broken cleanly through exactly at the points where laser-engraved positioning marks had been made. During several conversations with FunAero, we determined that those engraved markings had been made too deeply in the joiner faces and had very likely caused them to fail. FunAero has fixed this design flaw by replacing the laminated spar joiners with thick plywood ones.

This was the first time I ever actually crash-tested a model! George was at least impressed by my piloting skills, if not by the condition of his model when I returned it to him, and he made me promise not to crash any of his other models! For durability and strength, the S.E.5a gets very high grades indeed!

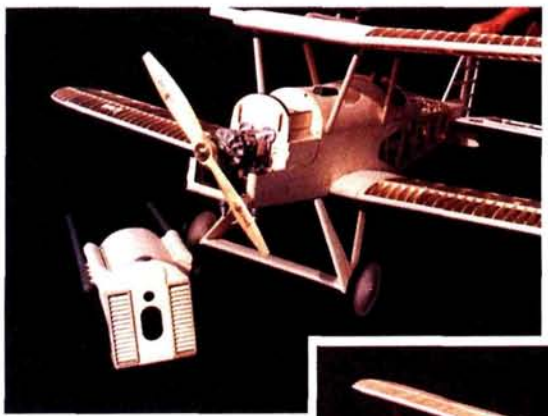
–Gerry Yarrish

a few thoughts went through my mind, not the least of which was how big it looked. That the components all came together without needing any adjustments was amazing; I have never built a large biplane that went together so easily.

FINISHING

I sheepishly admit that after the plane had been framed up, I lost a couple of weeks finishing it because I really enjoyed looking at it in "bare-bones" form. To cover it, I used Nelson Hobby Specialties ColorFAB Khaki so I'd only have to paint the upper surfaces. ColorFAB is a polyester fabric, and it's applied using a little heat; it has wonderful shrinking properties, and I covered all four wingtips without having even one wrinkle. When I had covered the parts, I reheated the open areas to "lock" the fabric's molecular structure and prevent it from wrinkling.

To paint the fabric, I used Nelson Hobby Specialties System Three water-based paint. This paint is thinned and cleaned up with water, and you can use it indoors because it is odor free. You can spray it on, but for the best results, I recommend that you brush it onto the fabric. I experimented with a number of sponge brushes when I painted the S.E.5a, and the best



Access to the engine is by means of a removable cowl—no space issues here!

It's almost too pretty to cover, isn't it?

results were obtained using a good-quality dense sponge brush that I bought at a paint store. It took four coats of paint to achieve the look I required. Even after the third coat, the paint looked streaky; however, after the fourth coat, the plane looked perfect.

I had graphics that I made from pencil drawings custom-cut by Model Graphics. The graphics were cut out of Scotchcal 220 film and are unique in the way they adhere to the painted surfaces. They seemed to virtually "melt" into the surface and resemble painted graphics. To apply them, soak them and the surface with window cleaner then remove the backing from the graphic and place it where you want it. I keep the area wet with window cleaner, and when I'm satisfied with the graphic's placement, I squeegee out any air bubbles and excess cleaner from under it, and let it dry overnight. After 24 hours, the graphics looked as if they had been painted on. Most people who have seen my S.E.5a think I'm a talented painter! (Model Graphics now sells a set of graphics for the FunAero S.E.5a as a standard item.)

SUMMARY

The S.E.5a was a very satisfying project; the folks at FunAero can be proud of this kit. I really enjoyed building it and adding the little bits and pieces that bring a model to life. The kit's engineering and laser-cut parts are superb; I've never built a large-scale biplane that was right on. Best of all is how the plane looks and flies. It has all the charm expected of a WW I model. Check it out; I think you'll agree. ✈

Du-Bro Products (800) 84-9411; dubro.com.

FunAero R/C (803) 499-5487; funaero.com.

Futaba Corp. of America; distributed by Great Planes Model Distributors Co. (800) 682-8948; futaba-rc.com.

Model Graphics (377) 269-5177; model-graphics.com.

Nelson Hobby Specialties (877) 263-5766; nelsonhobby.com.

Nick Ziroli Plans (631) 467-4765; ziroliplans.com.

Robart Mfg. Inc. (630) 584-7616; robart.com.

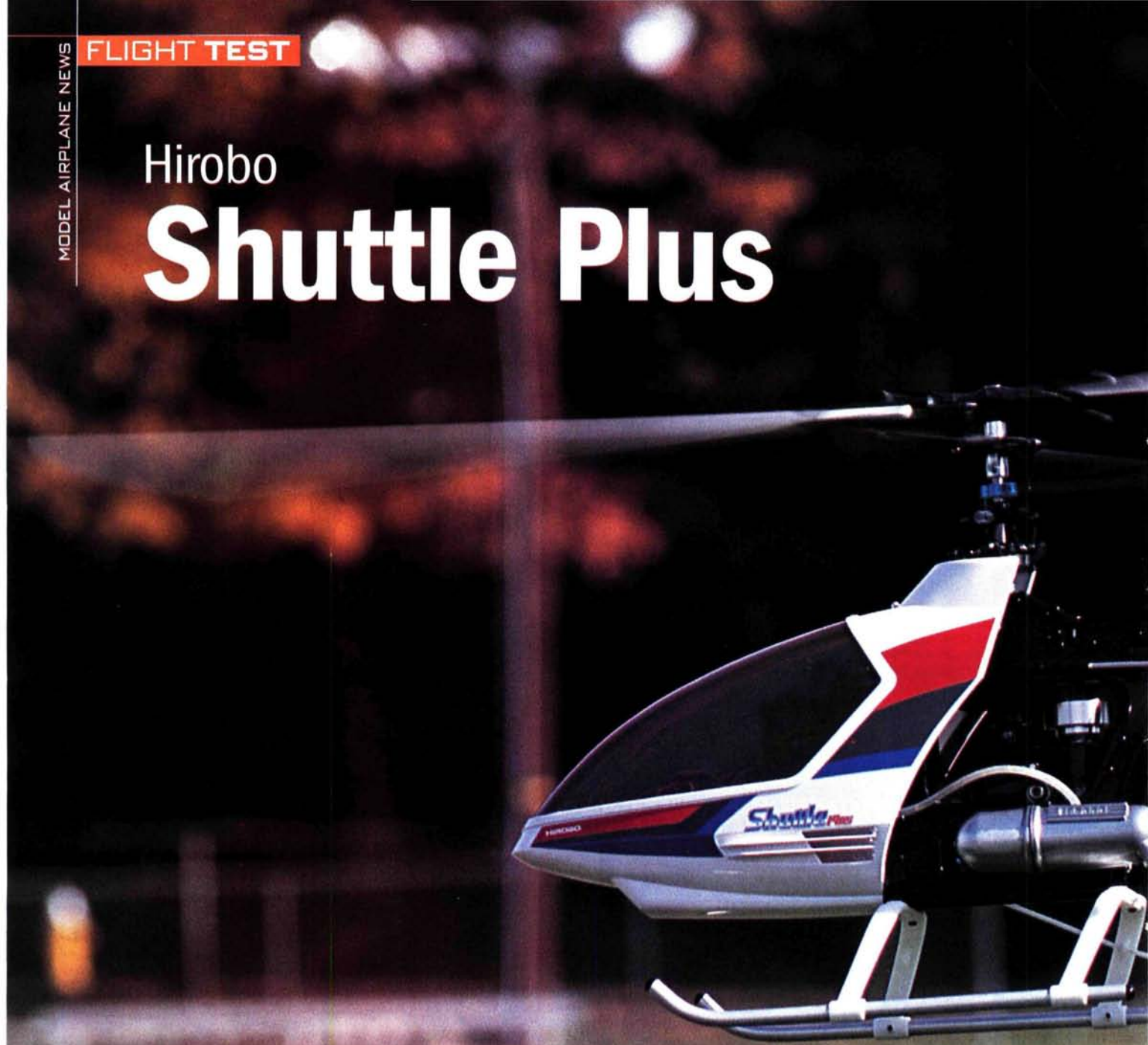
Tower Hobbies (800) 637-6050; towerhobbies.com.

Williams Bros. Inc. (805) 534-1307; williamsbrosinc.com.

Zenoah; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

Zinger; distributed by J&Z Products (310) 539-2313; zingerpropeller.com.

Hirobo Shuttle Plus



A new spin on an old favorite

by Phyllis Bell

For more than 15 years, the Hirobo Shuttle helicopter series has been flown and loved by pilots all over the world, and Hirobo continues to improve the breed with its new Shuttle Plus. What sets the Shuttle Plus apart from other Shuttles? By doing a little research, I learned that Hirobo has made several changes that improve the quality, durability and safety of an already great heli. And to add to the value, Hirobo has dropped the price of the Shuttle Plus; it's one of the least expensive .30-size collective-pitch helicopters on the market today.

SPECIFICATIONS

MODEL: Shuttle Plus

TYPE: collective-pitch helicopter

MANUFACTURER: Hirobo

DISTRIBUTOR: MRC/Altech Marketing

ROTOR DIAMETER: 48.75 in. (1,244mm)

LENGTH: 41.5 in. (1,075mm)

ENGINE USED: Hirobo .36R heli engine

RADIO REQ'D: 5-channel heli radio

RADIO USED: Futaba 9C

GYRO USED: Futaba GY240

FUEL USED: Wildcat 30-percent-nitro heli

PRICE: $210

FEATURES: heavy-duty clutch; RG-style tail fins; beefy tail-boom supports; new composite frames; finished main blades; upgraded swashplate, muffler and starting wand; good manual; colorful decals.

COMMENTS: what can I say? It's a Shuttle! Building it was very familiar; the parts fit together very well, and the assembly went quickly. What really sets this apart from earlier Shuttles, though, are the improvements Hirobo has made. The new clutch design (more durable), the SE-type tail-pitch lever (ensures solid tail-rotor response) and the larger muffler all contribute to make the Shuttle Plus a helicopter that beginners can take from hovering to advanced aerobatics.

HITS

- Easy to build.
- Simple mechanical layout.
- Performs great.
- Colorful decals.
- Replacement and optional parts are readily available.

MISSES

- Unable to secure radius block.

A number of features have been upgraded in this new Shuttle. For starters, the blade grips have adjustable linkage geometry to suit both beginners and experts; you can now tune the control response to match your flying skills. A new heavy-duty clutch will ensure many trouble-free hours of operation, and the tail-boom supports are almost the same size as those on larger .60 helis. With the improved performance that we've seen in helis over the past few years, one change I'm really glad to see is that the blade bolts have been increased in diameter from 3mm to 4mm. There's no chance of losing a blade with these larger, stronger bolts. Other changes include a larger muffler that allows the engine to breathe more easily, RG-style tail fins and an SE-type tail-pitch lever for solid tail-rotor control. A big surprise, though, was the included Sceadu high-performance fan and flywheel assembly. This unit does away with the tapered-collet system that centered the fan on the engine. It instead threads onto the engine's crankshaft and eliminates a very tedious task. These changes make a more precisely engineered machine. Let's put it to the test!

Left: the basic chassis is ready for the servos, engine and tail boom. Below: the upgraded swashplate on the right operates smoothly and will last a long time. Use it instead of the all-plastic swashplate.

WHAT'S IN THE KIT?

When I opened the box and pulled out the instruction manual, I was happy to see that all of the subassemblies had been packaged separately and numbered to correspond to each step in the manual. This really helps to speed up the construction. During my exploration of the kit's contents, I discovered an upgraded swashplate. This wasn't mentioned in any of the literature included with the kit, so be sure to look for it.

ASSEMBLY NOTES

This review is not intended to provide a blow-by-blow description of each assembly step; instead, I'll cover the areas that need special attention or are not covered in detail in the manual.

Construction starts with the elevator and aileron levers and quickly moves to the main frames. Though the frames may look familiar, they are cast from a new type of resin that increases their strength and durability. One thing is for sure; the screws thread much more tightly into the frames—so tightly that my wrists were soon sore!

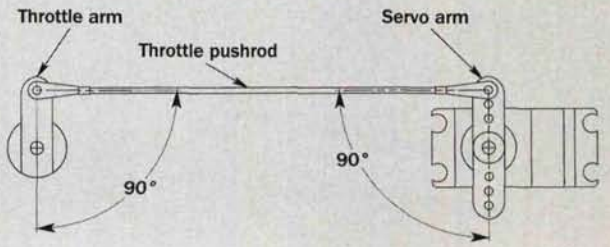
THE PERFECT THROTTLE SETUP

One area that most troubles beginners is setting the throttle-pushrod geometry. If your heli doesn't climb out quickly, or it seems to lack power (assuming the engine is properly tuned), chances are pretty good that the pushrod length needs to be adjusted. When you set up the throttle, remember the rule of 90 degrees and that the throttle must lead the pitch (load). To get linear control throws, the pushrod should ideally be positioned at 90 degrees on the throttle and servo arms. This will ensure that the carburetor barrel is closed at low stick, fully open at high stick and 50-percent open at ½ stick.

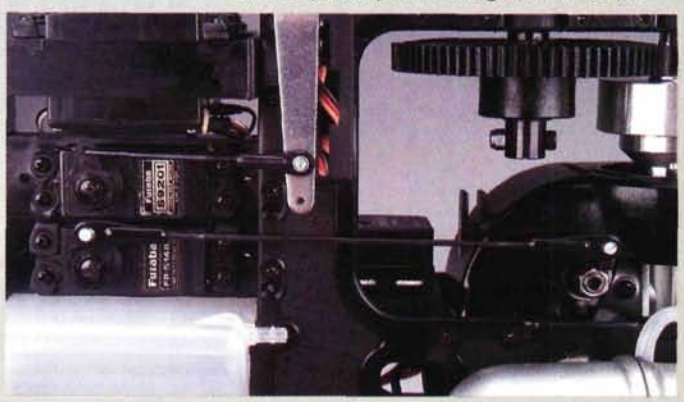
Also remember the concept of power leading the pitch; it's like trying to drive a stopped car in fifth gear instead of in first. It's difficult, and the engine will buck and heave because of the load being placed on it. The same thing applies to helicopters; if the throttle lags behind the pitch (load), it will bog the engine down, and throttle response will be poor.

Before you adjust the pushrod, reset the throttle curve points on your radio to the default settings and the servo travel (ATV) to 100 percent. Most radios have five points: 0, 25, 50, 75 and 100. For the time being, we're interested only in the 0, 50 and 100 points. Picture a rectangle; now adjust the links or the throttle pushrod so that one is centered over the throttle barrel and the other is centered over the servo-output shaft. Next, place a ball on the servo arm and the throttle arm of the carburetor so that they're both the same distance from the center of rotation (or as close as you can get them). Turn on your radio, set the throttle at ½ stick, and place the servo arm on the spline that will position the arm at 90 degrees to the linkage. Use throttle subtrim if necessary, and then install the pushrod on the servo arm. Move the throttle stick to full low. The link should be centered over the ball; if it isn't, adjust the ATV. Now move to full high stick, and again, the link should be centered over the ball; adjust it if necessary.

Ideally, the ATVs should be within a few points of each other; if they aren't, you can move the ball in or out on the servo arm, or you can adjust the throttle-servo subtrim. The more closely the ATVs are matched, the more linear the throttle response will be. It may take some fiddling, but take the time to set it up just right, and you'll realize the full potential of your engine.

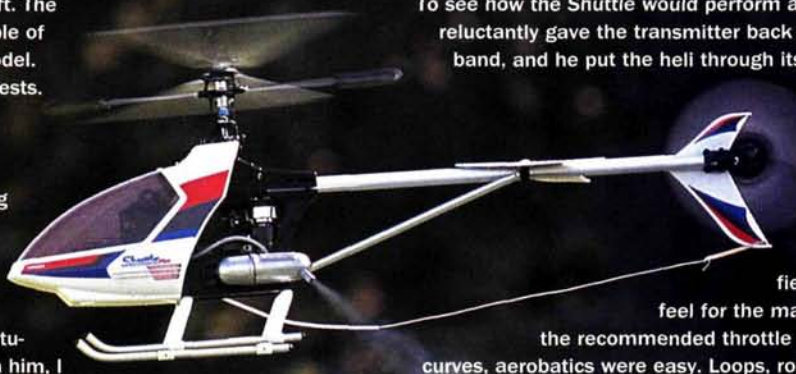


Above: to get the best performance from your engine, you need to properly set up the throttle. As the diagram shows, the pushrod should be at a 90-degree angle to the arms to ensure linear control throws. Below: here's my Shuttle throttle pushrod at ½ throttle. I was able to set both arms at 90 degrees using the steps outlined. Note the collective pushrod above it; it, too, is at 90 degrees at ½ stick.



FLIGHT PERFORMANCE

After I had finished assembling the Shuttle Plus, I asked my husband to check it before its first flights. He also did those first important trim flights for me. He said that I had assembled it correctly. All the fasteners were tight, and the setup was as specified in the instruction manual. He also checked the center of gravity (CG), as this is important for any aircraft. The CG was slightly aft, so he added a couple of ounces of weight to the front of the model. We were then ready to start the flight tests.



GENERAL FLIGHT CHARACTERISTICS

The first test hops confirmed that "doing it by the book" was the way to go, as it needed only minor trim corrections. Blade tracking was also very close to being perfect, and the head speed was at a comfortable rpm. When I was eventually able to wrestle the transmitter from him, I was in for a treat. I was nervous at first with my new heli, but I knew that it was properly trimmed, and that helped to calm me. I found the Shuttle very stable and comfortable in my hands. It was responsive but not twitchy, as I've heard that smaller helis can be. This really boosted my confidence. Its forward flight characteristics are solid, and it grooves right along. The Hirobo engine is a great match for the heli, and it never missed a beat. I used Wildcat 30-percent-nitro heli fuel, and the engine loved it.

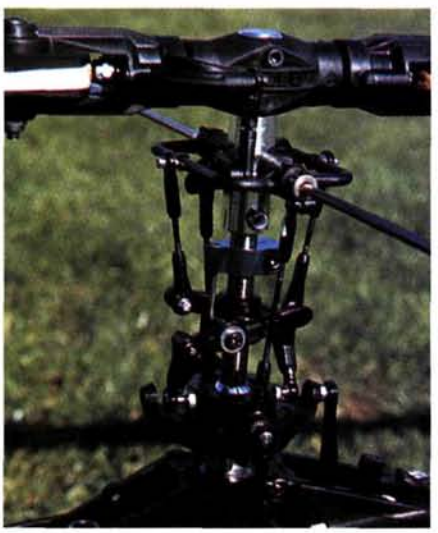
AEROBATICS

To see how the Shuttle would perform aerobatics, I reluctantly gave the transmitter back to my husband, and he put the heli through its paces. He engaged the idle-up and flew a few circuits around the field to get a feel for the machine. With the recommended throttle and pitch curves, aerobatics were easy. Loops, rolls and 540 stall turns looked pretty good. He even did some mild 3D aerobatics! He did comment that changing the curves to full 3D settings and replacing the wooden blades with a set of composite aerobatic blades would allow just about any maneuver.

Before you mate the frames, make sure that you capture the elevator lever between them; if you don't, you'll have to separate the frames and start again. When I installed the bearings that support the main shaft, I used the shaft to align them properly. The collective-pitch lever, fuel tank and servo mount are also added to the frame. These subassemblies went together easily in less than 30 minutes. Next was the installation of the main gear. Here, I took extra care to make sure that the main shaft was seated before I secured the mast lock. There shouldn't be any vertical play in the shaft.

MAIN-ROTOR ASSEMBLY

The rotor head is the tried-and-true FZ unit that performs very well. It can be built quickly and easily. Pay careful attention when you screw the balls onto the blade grips; they can be screwed into two possible positions. This is one of the changes that Hirobo made to adjust the control response. The manual recommends the use of the inner hole, and if you're a beginner, this is the one to use.



Above: the pushrod and servo layout will be familiar to anyone who has built a Shuttle; the pushrod runs are short and direct, and the system is easy to work on. Note the new larger muffler; it's a great added value. Right: the control system may look complex, but it's really very simple. The upgraded swashplate has a composite outer ring, and its inner ring is metal. I replaced the plastic radius block with a blue-anodized metal one; it can be clamped more securely to the shaft than the stock unit.

I paid special attention when I built the flybar assembly, as it must be centered in the rotor head, and the paddles have to be parallel with each other. I also balanced the rotor head, even though the manual says nothing about doing this. I used a Robart High-Point balancer to balance all of the heli's rotating parts. The plastic swashplate is included in the parts bag for step 13; please discard it and use the upgraded swashplate.

One part that gave me a little trouble was the radius block (or swashplate driver). When it's secured on the main shaft and tightened, it shouldn't be able to move. (If it moves, the control inputs will not be properly timed.) No matter how hard I tried, I couldn't get it to clamp tightly on the shaft, so I replaced it with a metal unit. You can simply use a file to open up the gap between the ears in the block. When you tighten the screw, it pulls the ears together so the block clamps more tightly on the shaft.

TAIL-ROTOR ASSEMBLY

I thought the tail rotor looked a bit intimidating to assemble, but it was actually pretty simple; it went together precisely. Just be careful not to overtighten the bolt that holds the guide pulley; if you do, it will bind and quickly wear out. Also, make sure that you install the drive belt before you screw the gear-case halves together. Again, I balanced the tail-rotor assembly before I installed it on the output shaft.

I inserted the tail boom into the main-frame assembly, making sure that the drive belt was twisted in the proper direction. (If it isn't, the tail rotor will rotate in the wrong direction.)

ENGINE INSTALLATION

To power my Shuttle, I used the new Hirobo .36R engine. This little powerhouse is specifically designed for .30 helis, and it is a drop-in replacement for any of the popular .30-class engines. I screwed the cooling fan onto the flywheel and then balanced the assembly. As mentioned earlier, the flywheel now threads onto the crankshaft.

This simple change really cuts down on assembly time and eliminates a major source of vibration. From the first liftoff, my Shuttle flew smoothly. Be sure to screw the fan assembly very firmly into the crankshaft, along with the drive nut; you don't want it to loosen. For added peace of mind, I used a little thread-locking compound on the crankshaft.

I next bolted the clutch into place and then slid the engine into the frames. Be sure to install the fan shroud before you install the engine! When the engine was aligned, I added the included muffler, fuel and pressure lines. After that, I added the landing gear, tail-boom supports and tail fins. Hey; it's starting to look like a helicopter!

The tail-rotor pitch-change mechanism is the SE type; it holds the pitch plate in two places, and that ensures a solid tail-rotor response. The tail rotor is belt-driven; it requires very little maintenance and is very reliable.

RADIO INSTALLATION AND SETUP

The servos are installed in the trays using the supplied screws; pay attention to the servos' orientation. Next, install the switch harness and gyro. I use a Futaba GY240 with great results. Now assemble the pushrods to the lengths specified in the manual, and follow the manual's instructions for pushrod installation and servo-arm placement. Hirobo has done a great job of clearly illustrating where the pushrods should be attached to the servo arms and how all the bellcranks and levers should be placed in relation to one another. When you've completed these steps, you can follow the graphs shown at the end of the manual to set up the pitch and throttle curves.

The wooden main-rotor blades come covered, and the root reinforcements have been attached. I gave them a quick balance check and found that one blade was slightly heavier than the other. A strategically placed piece of trim tape quickly fixed the problem. I added the decals to the canopy and tail fins, did a final check of all the components, and I was ready for flight.

FINAL THOUGHTS

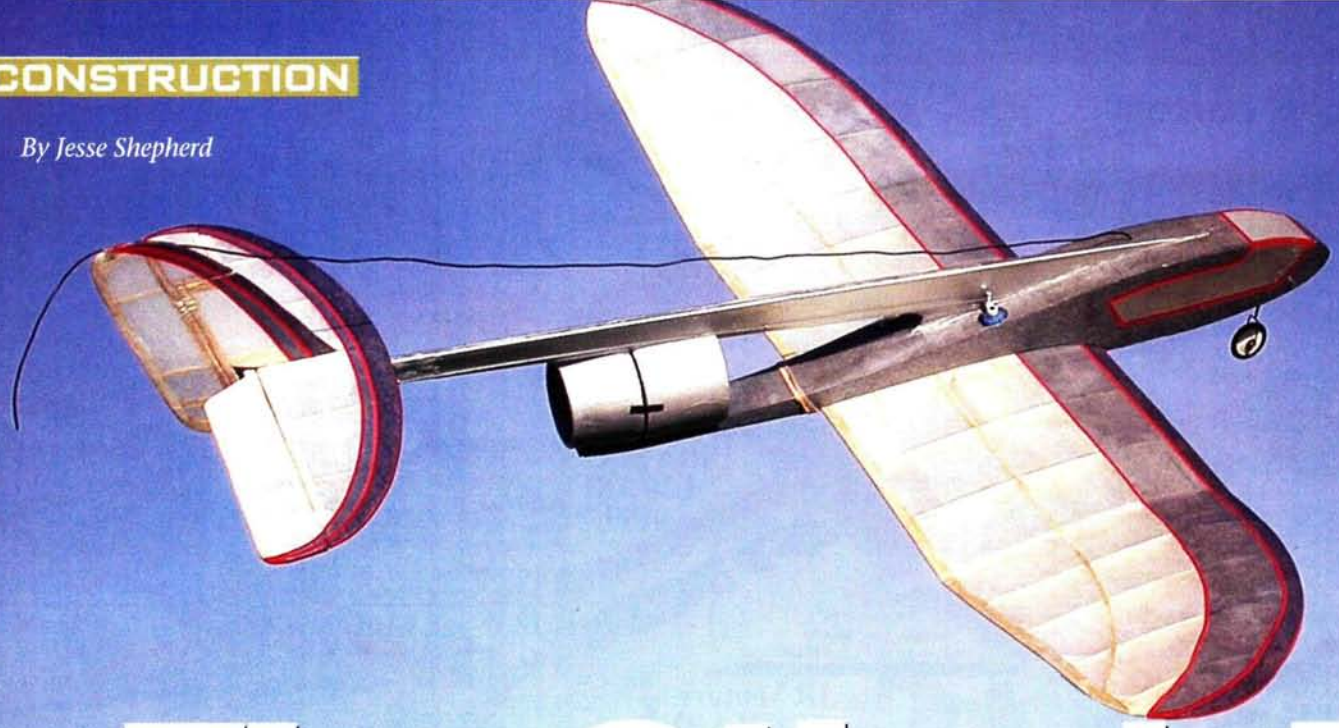
The Hirobo Shuttle Plus is a high-quality helicopter that's ideal for those who are just starting out and for experienced pilots who are looking for a low-cost heli. It can be assembled quickly and easily; with the exception of the radius block, I didn't have any problems with any parts fit. The exploded-view illustrations and full-size drawings of the small parts for each assembly step help make building easy. Flight performance is very good, as it should be; after all, it's a Shuttle!

I have run a few gallons of fuel through it, and it doesn't show any signs of wear; the engine runs better and better. This is a very nice helicopter that will give many years of service.

Hirobo; *distributed by MRC/Altech Marketing (732) 225-6360; modelrectifier.com.*
Futaba Corp of America; *distributed by Great Planes Model Distributors Co. (800) 682-8948; futaba-rc.com.*
Robart Mfg. *(630) 584-7616; robart.com.*
Wildcat Fuels Inc. *(888) 815-7575; wildcatfuel.com.*

CONSTRUCTION

By Jesse Shepherd



The Sting'r E Mk. I & Mk. II

An electric ducted-fan flyer for one or two motors!

The Sting'r E Mk. I and II are the first electric ducted-fan models I have ever designed, and they have been a blast! The Mk. I uses a single-fan unit for power, and the Mk. II uses two fans. Both are fairly easy to build, and they're good flyers. Either one will reward you and thrill your audience!

The author poses with two of his Sting'r E models.

SPECIFICATIONS

MODEL: Sting'r E Mk. I and Mk. II

TYPE: electric single or dual ducted-fan sport flyer

WINGSPAN: Mk. I, 32 in.; Mk. II, 36 in.

LENGTH: 27.5 in.

WING AREA: Mk. I, 196 sq. in.; Mk. II, 223 sq. in.

WEIGHT: Mk. I, 9.5 oz.; Mk. II, 15.5 oz.

WING LOADING: Mk. I, 7 oz./sq. ft., Mk. II, 10 oz./sq. ft.

MOTORS USED: one or two K&P Aero Models KP-44 fan units

RADIO REQ'D: 3-channel (rudder, elevator and throttle)

COMMENTS: designed by Jesse Shepherd, the Sting'r E Mk. I and Mk. II are lightweight electric ducted-fan sport flyers that use one or two KP-44 fan units for power. Traditional balsa and plywood construction is used throughout, but you should use 4 to 6 lb./cu. ft. balsa for construction. The dual-fan version has excellent flight performance, and the single-fan version flies nicely in calm conditions.

Most of the parts needed to build the model are pictured here. Make a kit before you begin to build.

CONSTRUCTION

Keep it light! Study the plan and make a kit of the parts before you start to build. I used 4- to 6-pounds-per-cubic-foot balsa for lightness; if you use 8-pound balsa, use 1/20-inch sheet when 1/16 inch is called for. Construction is relatively easy if you know basic building techniques and which glues to use.

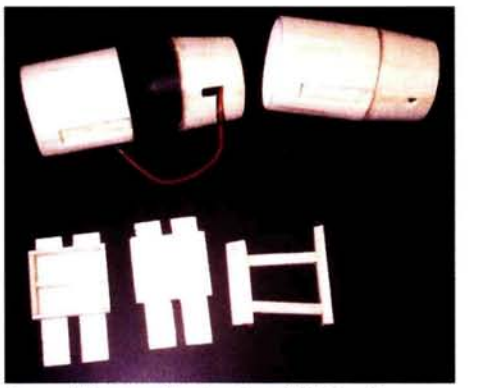
WING

I used the stack-pin-cut-notch-and-sand method to form the center ribs. Each tip rib differs in length and contour, but they have the same spar spacing as the center ribs. The wing is built in three sections (the Mk. II wing has two extra rib bays). Start with the tip sections: the tip former and trailing edge must be shimmed as shown on the plan to provide washout, and the tip leading edge must be tapered, moistened and prebent to shape. Align and glue the tip ribs to the shimmed trailing edge. Glue the leading edge into its tip-former groove, and then bend and glue it to the other ribs; use the template to make sure that they are aligned and that the dihedral rib is at the proper angle. Add the rib gussets, sand the rib notches to fit the top spars, glue them and set them aside to dry. Lay out the trailing edge and leading edge of the center section, and glue in the dihedral ribs.

Next, build the landing-gear torque-tube assembly using a clamp plate and screws. Align and position the plate's notches with the notches in the four center ribs, and glue the assembly into place. Add the remaining ribs, top spars and gussets. When the glue has dried, sand all four dihedral rib surfaces flat and glue the three wing sections together with the tip height as shown. Glue in all lower spars and the 1/16x1/8-inch outline around the torque-tube assembly. Sand the tip former to shape, sheet the center section and sand all the surfaces smooth. The leading-edge wedge fairings and wing dowels will be installed later.

The hatch is built inside its opening in the fuselage; use a protective plastic sheet to prevent it from being glued into place.

The basic nacelle parts are wrapped around the fan unit (plastic wrap protects the fan). The balsa semi rings are used to form the inner separator rings.



A complete nacelle structure (right) and another that shows the fan unit.

TAIL SURFACES

Cut the horizontal stab and vertical fin parts, glue them together and sand them smooth. Separate the spars, and then shape the edges and spars so that they can be hinged and covered. After you've covered the surfaces, install your favorite commercial hinge material and the control horns. I use figure-8 thread hinges and 1/32-inch ply horns.

FUSELAGE

The Mk. I and II fuselages differ only in length and nacelle-mount design. The fuselage uses sheet-balsa box construction with doublers, bulkheads and formers with a cross-grain top and bottom sheeting. The

FLIGHT PERFORMANCE

I conducted the first test flights at the Dallas Electric Aircraft Flyers Fun Fly. The curious crowd was pleased to see these unusual mini electric ducted-fan models perform so well. The dual-fan version's flights exceeded all my expectations; it flew perfectly during takeoffs, touch-and-go's and rolls and loops! The single-fan model should not be flown in winds greater than 15mph, but it has proven its ability in calmer conditions.

The starting current drain for each fan unit is around 8 amps, but they produce about 85 grams of thrust (almost 3 ounces) and are limited to 4 cells (4.8 volts). Two battery packs are needed for the Mk. I: one 600mAh pack for the motor and one 110mAh pack for the receiver. If you use the Pixie 7P, you must cut the red wire leading to the receiver connector to deactivate the BEC circuit. The Mk. II uses 8, 600mAh cells with the motors wired in a series; this works fine with a 20A BEC controller, and it still provides enough reserve power to land safely. Using cruise throttle settings, I've had flight durations of between 5 and 8 minutes.

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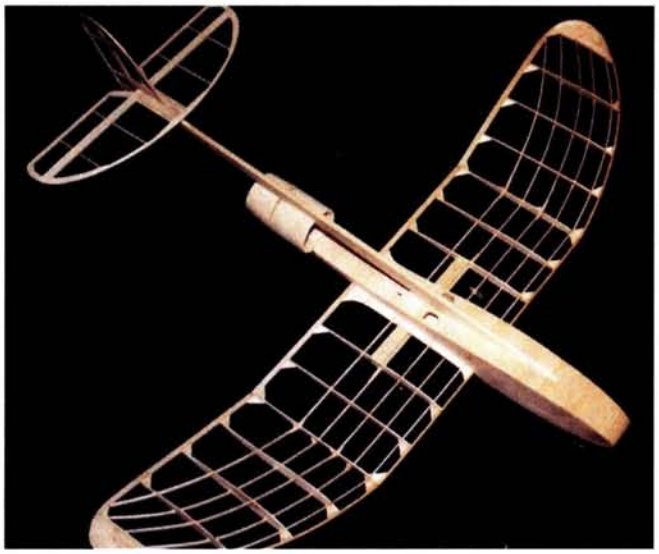

The single-fan Mk. I model ready to be covered.

boom is a frame made out of end formers, 3/16-inch square strips and spacers and 1/32-inch hard sheet sides. Weigh down the structure on a flat surface while the glue dries. Shape the tail mount and check the fit of the boom-mount notches. Center the boom on the fuselage, weigh it down, and block the fuselage to keep it and the boom centered and aligned. Shim or trim the mounting notches to keep the boom's aft end at the height shown on the plan, and then glue them into place. Glue on the nose blocks and shape them, and then add the top and bottom sheeting and the boom fairing.

Using a plastic-food-wrap-barrier, assemble the hatch frames within the hatch opening. Remove the frames, the sheeting and the forward alignment key. Glue the 1/16-inch nose-gear mounting tube and the back-up strips, but do not use CA (it may wick into the tube). Now, glue the hatch-key guides into place. Drill a hole for the hatch hold-down screw, and harden it with thin CA. The wing mount is left open for the servo and radio installation. Add the battery-mount strip and install the fan unit(s) to complete the assembly.

Mk. II's dual-fan exits; the motor wiring and wire connector are shown at the bottom of the photo.

WING MOUNTING

Do this before you cover the wing! First, ensure a good fit; then use rubber bands to secure the wing exactly on the centerline. Drill and tap the wing and mount block for a 6-32 nylon bolt, as shown. Harden the threads with thin CA, and when the glue has dried, re-tap the threads. Enlarge the wing hole to fit the 6-32 bolt. Through the hatch opening, hand-drill two 1/8-inch holes through the front mount holes into the leading-edge sheeting and spars as shown. Fit 1/8-inch dowels through the holes in the mount and into the wing so that they extend 1/16 inch forward of the mount and aft to the spar. To prevent glue seepage, glue the dowel into place from the inside of the wing. After the glue has dried, remove the wing, and add a 1/16-inch sheet cap to the dowels between the adjacent ribs and to the leading edge; then re-glue the installation. Shape the leading-edge fairing to fit the wing and fuselage contours.

FAN NACELLES

The lightweight nacelle designs of the Mk. I and II are the same except for the mounting-cavity dimensions. The aft section is removable to allow access to the fan unit and wiring. The forward and aft inner-sleeve assemblies are made out of 1/32-inch ply sheeting, with the fan shroud used as a form. The drawings show the details and dimensions for the forward and aft assemblies.

Use waterproof adhesive to glue together the sections of 1/32-inch balsa sheet (pattern sections are shown on the plan) and wrap them around the fan unit. Dope the inside surface and then dip the sheeting in water; it will curl up. Add the three 1/8x3/8-inch-wide balsa-filler rings and the two 1/64-inch ply rings to the forward and aft sleeves while they are on the form. Sand the aft balsa ring and sleeve behind the ply ring to the taper shown; leave a knife-edge at the aft end to fit the outer cone. Attach the outer sleeve and cone, and then add the inlet inner sleeve. After the glue has dried, install the fan and aft nacelle section. Fit the inner exit sleeve into the aft nacelle and against the fan; mark where it stops, remove the fan and forward section, and glue the exit sleeve into place at that mark. Fit and glue the nozzle cone inside the aft section to match the exit-sleeve end. Shape the inlet as shown on the plan and sand all the outer surfaces smooth.

To attach the single-fan nacelle, glue the top pylon into its cavity, sand the lower area to match the fuselage mount, and install the fuselage planking. Sand or shim the pylon to fit as needed and make a cutout in the lower aft section for the wiring to exit. The dual-fan nacelles are attached using a cruciform assembly, as shown on the plan. The removable aft nacelle sections provide access for soldering the motor wiring, capacitors and connector.

TAIL INSTALLATION

Rubber-band the wing into place, remove the attachment bolt and, with the wing flat and level, weigh down the tail assembly. Tack-glue the 1/64-inch ply flat mount into place. Use a straight, 10-inch-long stick tied to the top of the tail mount to make sure the tail assembly is straight and level with the wing. Finish gluing the mount, and add side supports made out of scrap trailing-edge material.

The tail assembly shows the control horns and the pushrod installation.

Cut out the fin-mounting slot in the horizontal surface, and glue in the vertical fin. To get a good wood bond, remove the covering from the tail's mounting surface, sand the aft end of the fuselage to match the fin spar, align the vertical fin with the fuselage and boom centerline, and glue them into place. Glue the sub fin to the boom and fin spar and sand them to shape.

LANDING GEAR

The torque-rod-style landing gear is very forgiving, and the details are shown on the plan. Install the main gears' vertical stubs in CA-hardened holes, lay the gear in the slots, and secure them with the cover plate and six screws (servo screws work well here). Attach the wheels, and

secure them with lock collars. The nose gear is made out of two struts that cross over each other and lock the wheel and axle-bearing tube into place. Solder the struts together, and then wrap and glue thread around them. Install the attachment clamp to the center torque wires, and screw the gear into place. I have access to a paved runway, and I love to take off and land with the wheels. I recommend using Peck-Polymers Vintage Series wheels. The landing gear can be removed if you prefer belly landings on grass.

CONTROL SYSTEM

I used a Hitec 555 receiver and two HS-55 servos, but any mini 3-channel system will do. Space is tight, so make sure that your equipment will fit. I installed the servos with two layers of thin, double-sided tape and wood spacers. I used 1/32-inch music-wire pushrods and Du-Bro Mini EZ connectors and Micro EZ link clevises to connect the servo arms and control horns. Small lengths of plastic tubing that are glued onto the side of the boom are used to guide the pushrods. You'll need to shorten the servo arms to clear the boom and to provide 3/8-inch rudder and elevator deflection. I used a Castle Creations Pixie-7P motor control in the single-fan version and a 20A Jamara Micro 480 control from Electro Aero Modeling USA in the dual-fan model. The ducted fans are available from K&P Aero Models Ltd., New Creations and other sources.

COVERING AND FINISH

The wing and tail are covered with heat-shrinkable Polyspan from Starline Intl. It only comes in white, but it can be tinted after you dope it by adding a dye to the thinner used with the finishing coats. Any lightweight covering can be used, but don't use heavier films. I used colored Japanese covering for all trim. I applied a light spray of aluminum paint on the nacelles and the boom and then a final coat of nitrate dope over all the surfaces. ✈

Castle Creations *(913) 438-6325; castlerc.com.*
Du-Bro Products *(800) 848-9411; dubro.com.*
Electro Aero Modeling USA *(972) 436-5826; eam.net.*
Hitec RCD Inc. *(800) 682-8948; hitechrcd.com.*
K&P Aero Models Ltd. *Castle Rd., Rowlands Castle, Hampshire, England PO9 6AS.*
New Creations *(936) 856-4630; newcreationsrc.com.*
Peck-Polymers *(619) 448-1818; peck-polymers.com.*
Starline Intl. *6146 E. Cactus Wren Rd., Scottsdale, AZ 85257.*

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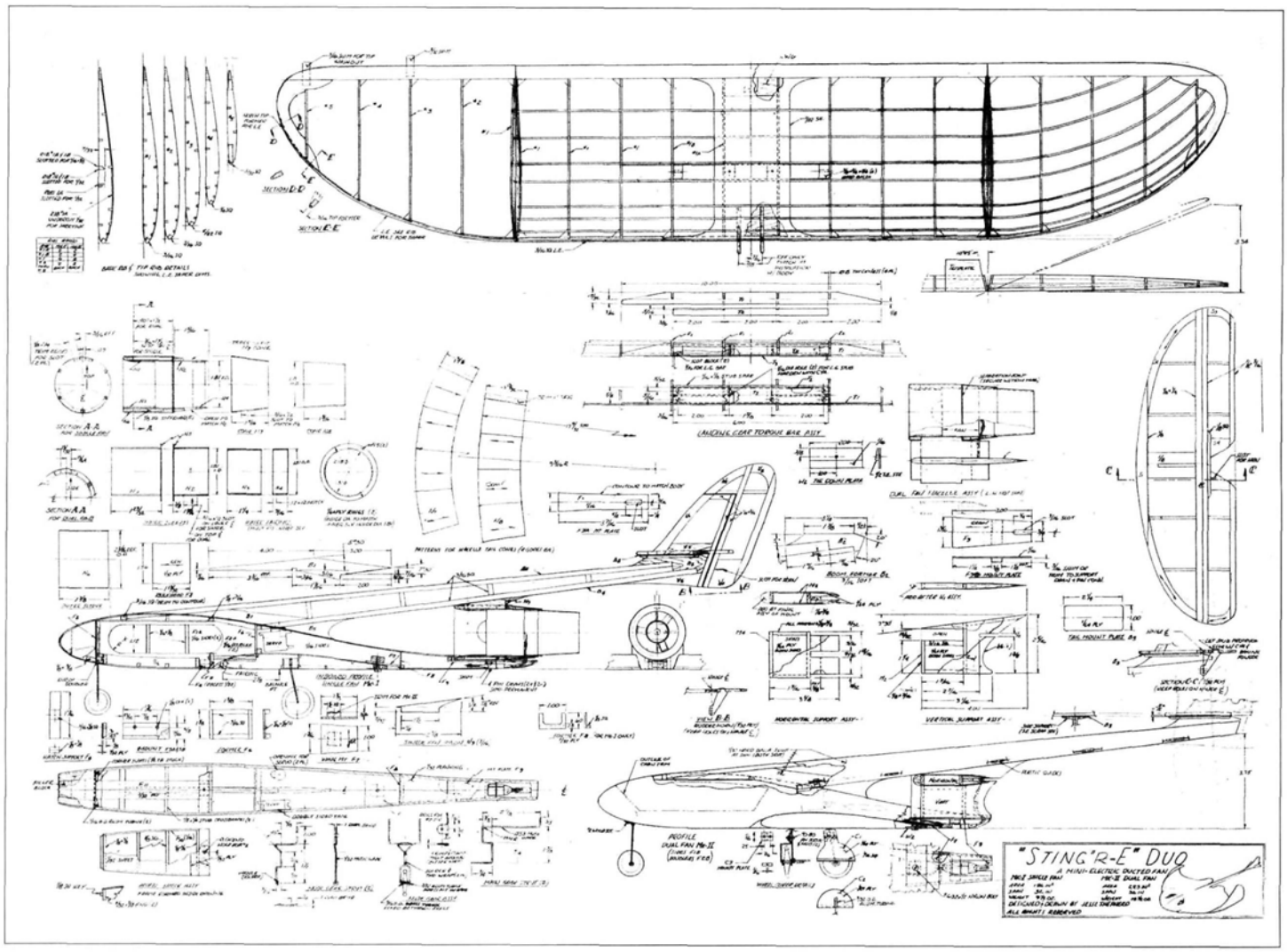
The Sting'r E
Designed by Jesse Shepherd, the Sting'r E Mk. I and Mk. II are lightweight electric ducted-fan sport flyers that use one or two KP-44 fan units for power. Traditional balsa and plywood construction is used throughout, but you should use 4- to 6-lb./cu. ft. balsa for construction. The dual-fan version has excellent flight performance, and the single-fan version flies nicely in calm conditions.
WS: 32 and 36 in.; power: 1 or 2 KP-44 electric ducted fans; 1 sheet; LD 2. $19.95



To order the full-size plan, turn to "RC Store.com" on page 156.

The Great RC Redesign Contest

by the staff of Model Airplane News

We at *Model Airplane News* really appreciate the tremendous response to "The Great RC Redesign Contest." This contest was very difficult for us to judge because of the hundreds of entries that we received; so many of them could have been winners! The time spent designing, engineering and implementing the changes to the models shows that modelers certainly enjoy customizing their aircraft. We were mightily impressed with the ingenuity and creativity of many of the entries—from applying bright, beautiful color schemes to changing high-wing trainers into low-wing twin-engine Sunday flyers.

Our thanks to all of you for participating, and check out the Click Trip for many more great designs. Keep up the good work, y'all!

Grand Prize!

EARL RITTER, HIGHLANDS RANCH, CO

Kyosho Bf109E

We all had our favorites, but after some discussion, we agreed that Earl deserves the $500 grand prize. He started with Kyosho's Messerschmitt Bf109E (a great model as is) and stripped the covering, installed retracts, recovered the model, painted it, added panel lines and rivet details plus a host of other refinements. We think you'll agree that Earl did an outstanding job. Congratulations, Earl!

WILLIAM ROBISON JR., MARY ESTHER, FL

Hobbico Hobbistar 60

While William was out flying one day, he lost his Hobbistar 60 behind some trees, and after retrieving the pieces, he decided to create this sharp-looking twin. He reshaped the high-wing trainer's fuselage, added nacelles to the wing and moved the main gear from the fuselage to the wing. William also made the wings to plug in. For his creativity, William nets the second prize of $250. Way to go, William!

CHIP BULLEN, PALM BAY, FL

Dymond Modelsports Blitz flying wing

For his efforts and ingenuity, Chip garners the third spot and $100 for his reworked Blitz flying wing. He used the T.L.A.R. (that looks about right!) method to design the booms, vertical fins and stabilizer. The booms are removable, as is the stabilizer, for ease of transportation. Great job, Chip!

JEFF WEISS, SACRAMENTO, CA

Global Fokker D-VII

There seems to be no limit to a modeler's creative energy, and Jeff's sharp-looking Fokker D-VII is a prime example. He really liked the model but wanted a more scale look, so he moved the ailerons from the bottom wing to the top wing, reduced the span of the horizontal stabilizer and added the counterbalances to the elevators. He shortened the nose of the fuselage by 3 inches and made new landing gear. Jeff then added a scale lozenge color scheme to the German fighter. Very nice, Jeff!

EVERETT RUBENDUNST, FOSTER, RI

Multiplex Cargo plane

Here's a great example of what you can do with a little thought, some filler and a foam airplane. Everett felt that the cargo plane had the looks of a PB4Y-2 Privateer Navy Patrol Bomber and went to work. He turned the fuselage upside-down and extensively reworked it along with the wing and tail surfaces to change their shape. He added foam blocks then shaped, filled and sanded them. He added gun turrets and other scale details; he also strengthened the wing with a plywood brace. We think Everett's work to create the Privateer deserves to be runner-up. Way cool, Everett!

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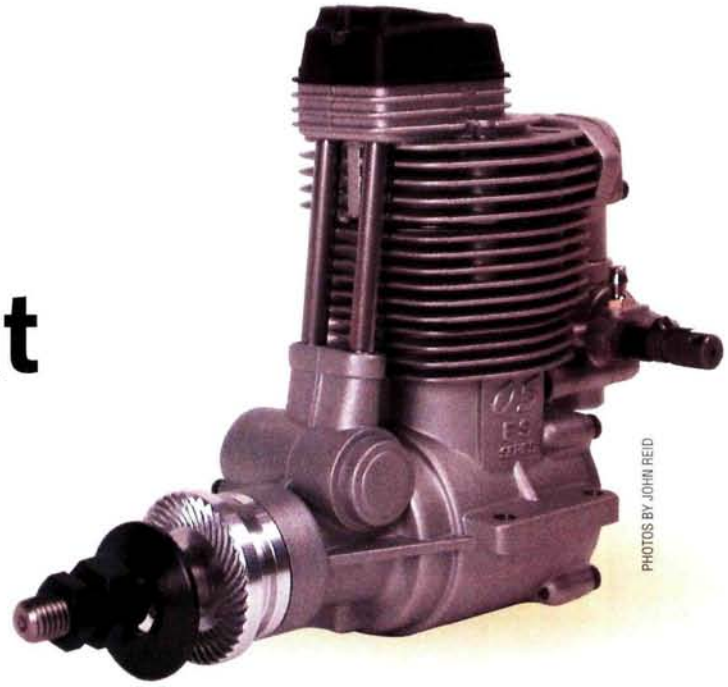
4-stroke-engine valve adjustment made easy

8 easy steps to optimum performance

by John Reid



PHOTOS BY JOHN REID

Four-stroke engines are marvels of miniature mechanical engineering. They're small enough to fit in the palm of your hand, and they produce up to 2hp. Even though they have twice as many moving parts as 2-stroke engines, 4-strokes provide hours of reliable service with very little maintenance. With so many moving parts, it is easy to see that timing is critical to smooth operation. Over time, a 4-stroke's moving parts wear, and this increases the gaps between them. Among the more crucial gaps are those between the rocker arms and the intake- and exhaust-valve stems. These gaps control valve timing, which in turn affects an engine's power output. If a gap is too large or small, it can greatly affect how an engine runs.

WHEN IS VALVE ADJUSTMENT REQUIRED?

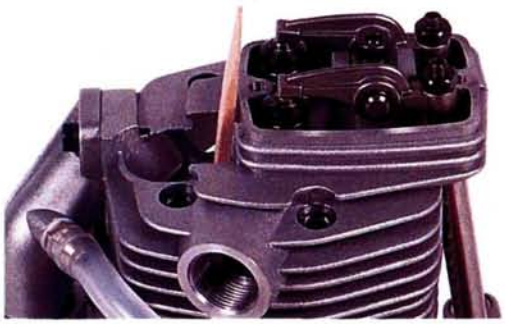
Engine-valve clearances are usually correctly set at the factory. You may never need to adjust your engine's valves; it depends on how much you use it. There are certain symptoms, however, that indicate a need to check and adjust the valve clearances.

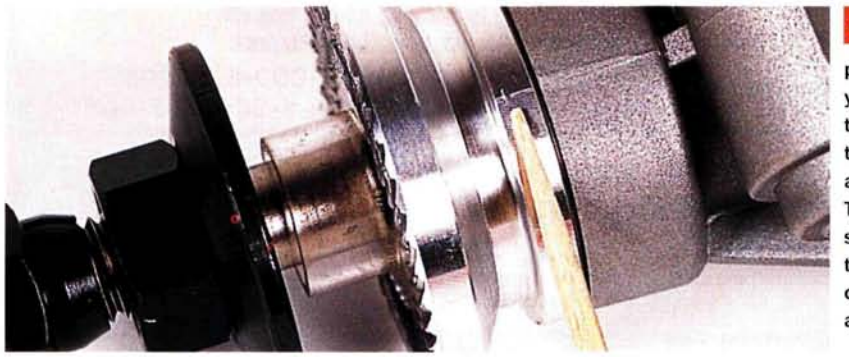
Check the valve clearance if there is a noticeable loss of power and after you've disassembled and reassembled you engine. Here's how to do it.

1 To adjust the valves on an O.S. 4-stroke engine, you'll need a thin (0.04mm) and a thick (0.10mm) feeler gauge, a 1.5mm Allen wrench and a 5mm wrench. Engines by other manufacturers may require tools of different sizes.

2 Begin by removing the valve cover to expose the rocker arms. Check and reset the valve clearances only when the engine is cold. If you check when it's hot, the metal will have expanded, and the clearances will be smaller than when the engine is cool.

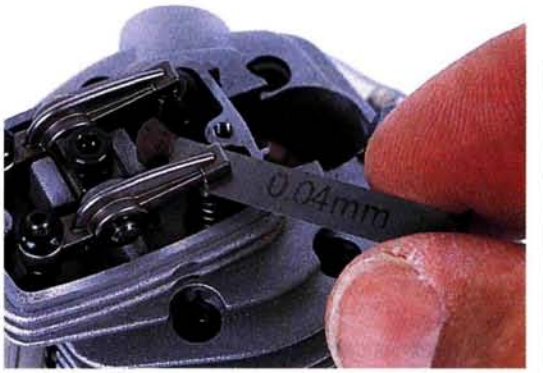
3 Before you adjust the valves, make sure that both rocker pushrods are at their lowest positions, i.e., the piston is at top dead center (TDC) between the compression and power strokes. There is also a TDC position between the exhaust and intake strokes. To find the TDC of either stroke, remove the glow plug and watch the piston while you turn the prop shaft. When the piston reaches its highest point in the cylinder, it has reached TDC. Insert a toothpick in the glow-plug hole and watch as it rises; stop turning the prop just before the toothpick starts to drop back into the cylinder. On the prop washer/hub, scribe a thin line that lines up with a line on the crankcase. (The O.S. 4-stroke shown already has a TDC mark on its prop hub.)

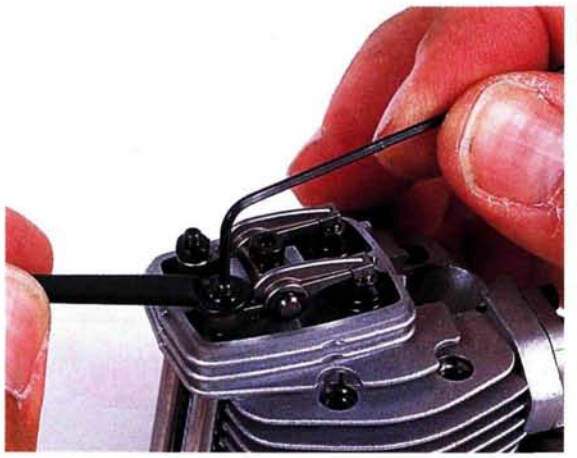




4 Next, find the correct valve and pushrod orientation between the compression and power strokes. Install the prop and glow plug, then turn the prop counterclockwise until you feel compression. Turn the prop ¼ revolution more until the mark on the prop washer/hub is lined up with the one on the crankcase. If you rotate the prop shaft back and forth about ⅛ inch and the rocker arms move, this is the wrong TDC position; the engine is between the exhaust and intake strokes. Rotate the prop one full turn counterclockwise until the marks are again lined up. This is the TDC between the compression and power strokes; rotating the prop shaft back and forth will not make the rocker arms move.

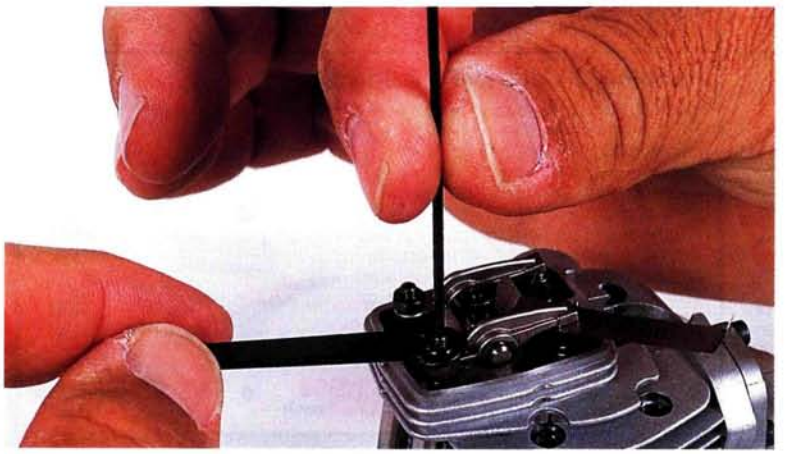
5 To check the rocker-arm valve clearance, insert the thin (0.04mm) feeler gauge; it should slide easily into the gap. Now try to insert the thick (0.10mm) feeler gauge; it should not fit into the gap. Be careful here; it doesn't take much force to depress the valve and allow the thick gauge to slide into the gap. The valves need to be adjusted if the thick gauge slides easily into place or if the thin feeler gauge doesn't fit.





6 To adjust the gap, carefully use a wrench to loosen the locknut on the rocker arm about ½ turn. Then use the Allen wrench to back the adjustment screw out about one turn (usually counterclockwise).

7 Insert the thin feeler gauge between the valve stem and the rocker arm, and gently tighten the adjusting screw until the rocker arm and the valve stem lightly touch the gauge. The adjusting screw can make a big difference, so use a light touch when making this adjustment. Grasp the Allen wrench using only your thumb and index finger as shown.



8 Retighten the locknut while you hold the adjustment screw firmly with the Allen wrench. Remove the wrenches and the feeler gauge, rotate the prop a couple of revolutions, and recheck the gap. If the clearance is correct, repeat these steps for the other rocker arm and valve assembly. After you have properly adjusted and checked everything, replace the valve cover. That's it!

When you set the gap for valve adjustments, it's important to remember that it is better to have too much play in the valve assembly than too little. With a wide gap, the valves won't stay open as long as they should. This doesn't really hurt anything and incurs only a small loss of power, but having a very small gap or no gap at all can burn and erode the valves and valve seats. You can always avoid this by making sure that the thin gauge slides easily between the rocker arm and the valve stem.

Periodic valve adjustment will ensure that your engine runs smoothly and will help to ensure hours of reliable 4-stroke engine service.

Model Motors AXI External Rotor Brushless Motors

A new spin on brushless motors

The AXI motors are best for direct-drive applications. You'll need a 5mm prop adapter for the output shaft.

by Bernard Cawley Jr.

Every once in a while, a new approach changes the way we do things. Over the last few years, electric power systems have been moving to brushless motors for all but the smallest and lightest models. This move has accelerated with the recent introduction of relatively inexpensive brushless motors such as the Jeti and Mega Motors.

Now a new, even less expensive "external rotor" design is making inroads in electric-powered models. Just what is the external rotor? In all the brushless motors we use, the windings are stationary and the permanent magnets rotate. In an external rotor, the magnets are attached to the outer case (can) of the motor, and the case with the magnets rotates around the fixed windings. This results in greater torque, and the motor can swing a larger propeller on direct drive versus a conventional brushless motor.

MODEL MOTORS LINEUP

The Czech firm Model Motors now produces two sizes of external-rotor-type motors, each in two winds—its AXI series. The first motor was the AXI 2820/10. It's about the size of a Speed 500 can motor and weighs 5.7 ounces, including wiring and 3.5mm bullet connectors. It's 1⅜ inches in diameter, has a ¾-inch-long stator and has a 10-turn winding. This motor is also available with a 12-turn winding. Later came the 4.9-ounce AXI 2814—a smaller version available in both 10- and 12-turn winds.

All the motors have a hefty 5mm-diameter shaft that is about ¾ inch long. The front endbell is a finely finished casting, and the three power leads exit from it. The motor must be solidly mounted from the front, and there must be clearance all around it for the rotating case. Two pairs of 3mm mounting holes on 1-inch centers are provided in the front case. This is the standard mounting-hole spacing for most motors of this size and larger.

SPEED-CONTROL REQUIREMENTS

Most sensorless brushless controllers with sufficient current rating work well with the AXI motors. My gold-label Jeti 40-3P controller works well with the AXI (older white-label controllers will not), and the Jeti Advance 40-3P also works very well, and it gives a bit more power when in the "hard timing" mode. Other possible controllers include the MGM ComPro TMM-40e-3ph and the Castle Creations Phoenix 35. I'm sure there are other suitable controllers in the Schulze Future and Kontronik Smile and Beat lines as well. Let's take a look at what these remarkable little motors can do.

APPLICATIONS

I have been flying an AXI 2820/10 for several months now in my JK Aerotech Big T. It's a cabin plane made of foam and Coroplast that has a 6-foot wingspan and weighs 5¼ pounds. I fly it primarily on a 10-cell pack that consists of Panasonic 3000mAh NiMH cells. After a little experimenting, I found that the APC 12x6 thin electric prop is best for this application. The motor turns this prop at more than 8,000rpm while drawing a little less than 40 amps at full throttle. My Big T, with 400 watts of power from the 2820/10, gets off a grass runway in three or four

SPECIFICATIONS

MODEL: AXI External Rotor Brushless Motor

MANUFACTURER: Model Motors Ltd.

DISTRIBUTOR: Hobby Lobby Intl.

DIMENSIONS: 1.38x2.14 in. (2820 Series); 1.38x1.91 in. (2814 Series)

WEIGHT: 5.7 oz. (2820 Series); 4.9 oz. (2814 Series)

PRICE: $98.50 (2820 Series); $89 (2814 Series)

Here's the AXI 2820/10 and its smaller brother, the 2814/10. Both are very compact and powerful for their size.

	RPM (no load)	MAX CURRENT (amps)	INTERNAL RESISTANCE	KV (rpm/volt)	NO. OF CELLS
AXI 2820/10	8,800	40	42mΩ	1,100	8 to 10
AXI 2820/12	7,400	35	62mΩ	920	10 to 14
AXI 2814/10	10,640	40	40mΩ	1,500	6 to 8
AXI 2814/12	10,160	35	58mΩ	1,270	7 to 10

I found that an APC 12x6 E prop was a good choice on my Big T. erformance from the 2820/10 was very good throughout my testing.

airplane lengths, climbs steeply and can do very large aerobatic maneuvers. In the hands of pilots more capable than I, the plane has flown extended knife-edge flight. Mind you, the Big T is intended to be a primary trainer, not an aerobat. After zooming around like this for 7 to 10 minutes, the little motor is rather warm to the touch, but not dangerously so. I operate it pretty close to its upper limits and beyond the manufacturer's recommendations, but with good cooling, I have had well over 50 flights and no problems. It does benefit from being mounted out in the breeze. Also, I don't fly whole flights at full throttle but rather a combination of aerobatics, cruising around and touch-and-go's. I can only imagine what this motor will be able to do in a 3½- to 4-pound sport aerobatic airplane.

I also bench-tested but did not fly the smaller 2814/10 motor. This dynamite 6- to 8-cell motor swings a 9- to 11-inch-diameter propeller at a healthy rpm. I can think of a bunch of 3-pound or so planes that use direct-drive speed 600-type motors and would get a big performance boost (as well as shed about 3 ounces of weight) using this motor. Models such as the Great Planes ElectroStreak and ElectriCub and any of the 6- to 7-cell direct-drive 2-meter sailplanes come to mind. The 2814/10 is small and light enough to also provide more power in planes designed for geared Speed 400 and 480 motors, such as the SR Batteries X-250.

The 12-turn motors of the AXI family—the 2820/12 and 2814/12—have similar capabilities but run at lower currents (35A peak rather than 40A) on more cells. They might be more suitable where longer run times are important, or where higher-cell-count packs are already being used, or where a larger-diameter prop is desired, such as on a sailplane or a scale model.

FINAL THOUGHTS

If I sound excited by the AXI motors, it's because I am. The simplicity of direct drive along with their low price make them very attractive to sport and scale modelers like me. They are equal to or better than the best geared brushed motors but have none of the maintenance requirements associated with them. They lower the price and raise the performance of electric model airplanes, and the simplicity and silence of direct drive really appeal to me. If these properties also appeal to you, I suggest you seriously consider the Model Motors AXI family of motors. ✈

***APC Props**; distributed by Landing Products (530) 661-0399; apcprops.com.*
***Castle Creations** (913) 438-6325; castlecreations.com.*
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***Hobby Lobby Intl.** (615) 373-1444; hobby-lobby.com.*
***JETI**; distributed by Hobby Lobby Intl.*
***JK Aerotech** (503) 663-4081; jkaerotech.com.*
***Kontronik**; distributed by Northeast Sailplane Products (802) 655-7700; nesail.com.*

Background: a look inside the case of the 2820/10. The rear endbell, can, magnets and shaft . All of this rotates around the stator when the motor runs. The rear bearing, stator, front endbell and power leads are shown in the foreground.

Mega Motors USA (888) 800-3663; megamotorsusa.com.
***Model Motors**; distributed by Hobby Lobby Intl.*
***Schulze**; distributed by R/C Direct (858) 277-4531; rc-direct.com.*
***SR Batteries Inc.** (631) 286-0079; srbatteries.com.*

Next-generation ready-to-fly

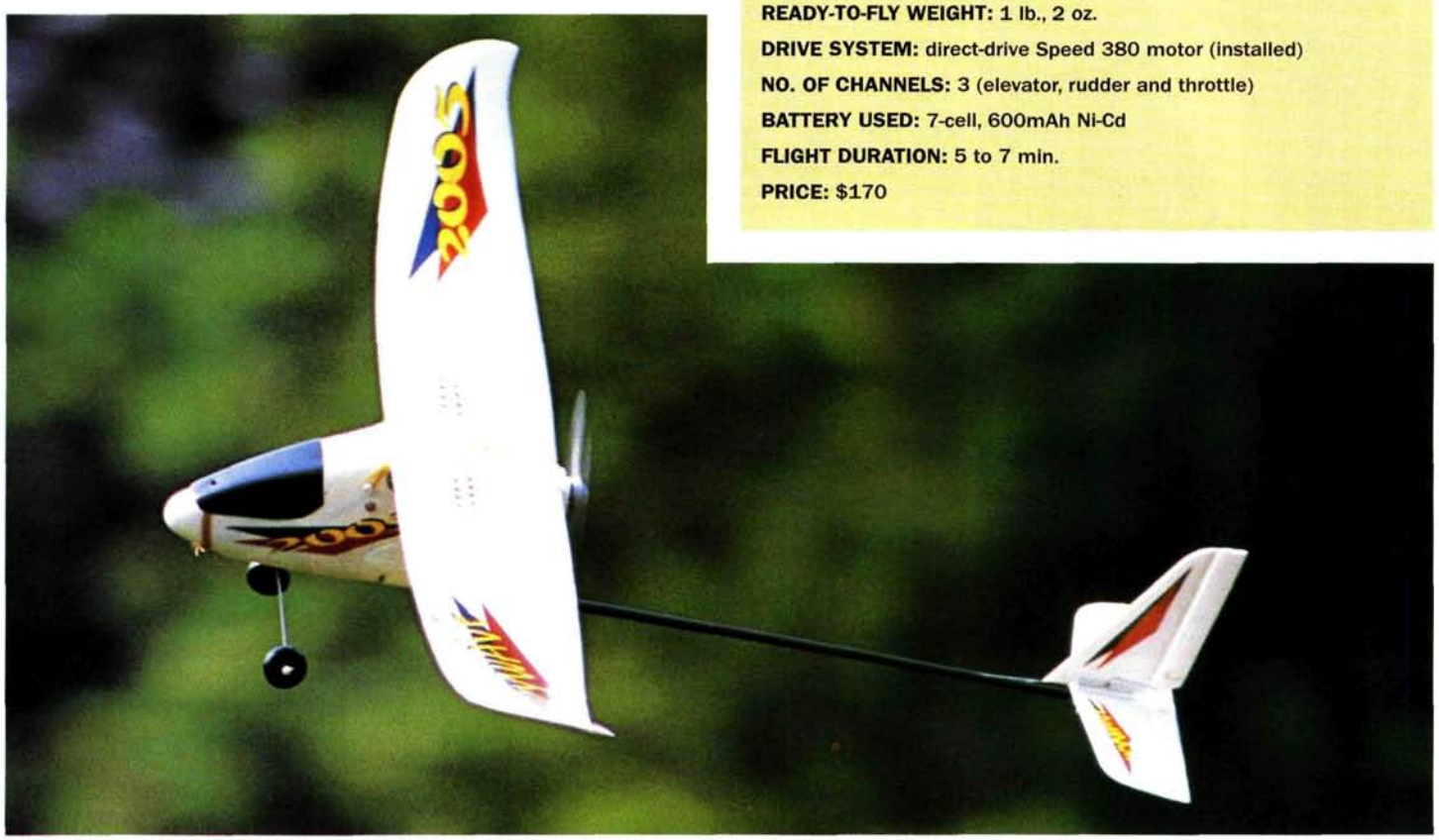
I know what you're thinking: it's difficult to believe that something constructed of plastic and foam and sold completely assembled will be able to fulfill the secret desires of dedicated modelers everywhere: to build bigger and fly higher. And though the new Skywave from Hot Bodies probably isn't going to win giant-scale competitions anytime soon, it really does have a lot to offer.

First, if you think you've stumbled across just another ready-to-fly pusher model, you ought to leave your preconceptions at the door. The new Skywave from Hot Bodies probably looks very familiar because it has the same pod-and-boom construction and pusher-power-type design as several other models on the market, but the similarities end there. The Skywave's flight capabilities place it in a category all its own.

Its main difference lies in its tail configuration; if you've already mistaken it for a V-tail, take a closer look. The Skywave is equipped with a rudder and elevator, and to be able to offer full rudder and elevator control, Hot Bodies needed to equip the Skywave with a third channel. That's right; it's a 3-channel, ready-to-fly pusher. The addition of the third channel is what really sets this model apart from the crowd. Now that I have your attention, read on!

SPECIFICATIONS

MANUFACTURER: Hot Bodies
MODEL: Skywave
WINGSPAN: 40 in.
LENGTH: 27 in.
READY-TO-FLY WEIGHT: 1 lb., 2 oz.
DRIVE SYSTEM: direct-drive Speed 380 motor (installed)
NO. OF CHANNELS: 3 (elevator, rudder and throttle)
BATTERY USED: 7-cell, 600mAh Ni-Cd
FLIGHT DURATION: 5 to 7 min.
PRICE: $170



The Skywave comes out of the box exactly as you see it here. Assembly is minimal and can be completed in minutes.

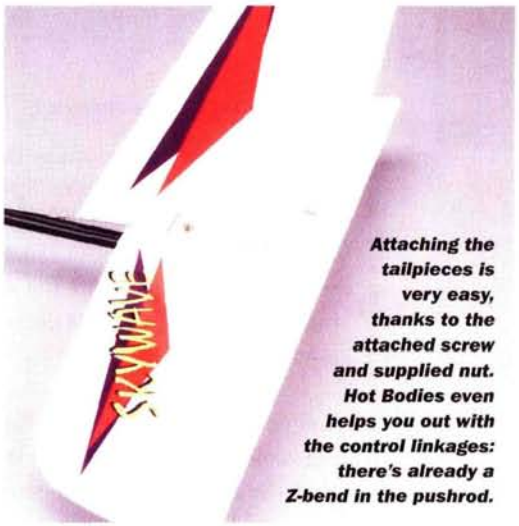
IN THE BOX

The Skywave comes out of the box almost completely assembled, with a 3-channel radio system, speed control and Speed 380 motor already installed. The main airframe consists of a carbon-fiber fuselage (boom) attached to a molded plastic pod that makes up the nose of the plane. The wing and tail feathers are constructed of molded foam and come with the decals applied.

In addition to the basic airframe, tailpieces and wing, the Skywave also comes with a transmitter, the prop, landing gear, a 600mAh Ni-Cd battery and an AC battery charger.

GETTING IT INTO THE AIR

Whether you're an experienced pilot with a lifetime of construction projects under your belt or a beginner fresh from the hobby shop, you'll need no more than 10 minutes to assemble the Skywave. Start by charging the battery; more than likely, the Skywave will be ready to go long before the battery is.



Attaching the tailpieces is very easy, thanks to the attached screw and supplied nut. Hot Bodies even helps you out with the control linkages: there's already a Z-bend in the pushrod.

The included 7-cell, 8.4V pack fits nicely in the Skywave's nose, and the attached rubber band holds the canopy securely in place.

As far as construction goes, there is none. It's more of an assembly process, and a really brief one at that. Simply attach the tailpieces and connect the factory-installed pushrods to the control horns. The screws that hold the stabilizer in place come already mounted on the fin and need only be inserted through the holes in the stabilizer and boom and then secured with the supplied nuts. Z-bends even come formed in the pushrods; it really doesn't get any easier than this.

Last, insert the landing gear,mount the prop and attach the one-piece wing with the included rubber bands. Place the battery in the nose of the model, beneath the black plastic canopy. That, too, is held in place with an attached rubber band.

THE BEST PART

First-time fliers should dial in a little up-elevator to prevent the Skywave from losing altitude immediately after it has left their hands. This simple adjustment of the trim lever on your transmitter allows you some extra time to get your fingers properly positioned on the control sticks. More experienced pilots will doubtless testify to the importance of that.

In the air, the Skywave climbs steadily into the wind. When it has reached a suitable altitude, switch off the motor and let the Skywave circle on the wind for a little while. When trimmed properly, it can even be flown hands-off for extended periods. Its glide performance is quite impressive.

While under power, the control response is quick, and thanks to its somewhat longer wingspan, the Skywave is relatively stable in roll. In fact, the best part about the Skywave's flight performance is its maneuverability. It has all the controllability you could ever want and yet remains docile enough to be used as a trainer. This model is certainly rugged enough to be flown by a first-time pilot, and it's durable enough for beginners to learn the basics of flight.

CONCLUSION

I'm certain that the Skywave will intrigue modelers of just about every ability level. Beginners will appreciate the Skywave's ease of assembly, but even veterans will find the design and performance of this ready-to-fly model tough to resist. Whatever your skill level, I'm pretty sure that everyone will agree on one thing: the Skywave is just plain fun! Pick one up and let me know what you think.

Hot Bodies *(909) 296-9340; hotbodiesonline.net.*

IMAC Aerobatics

Teardrop

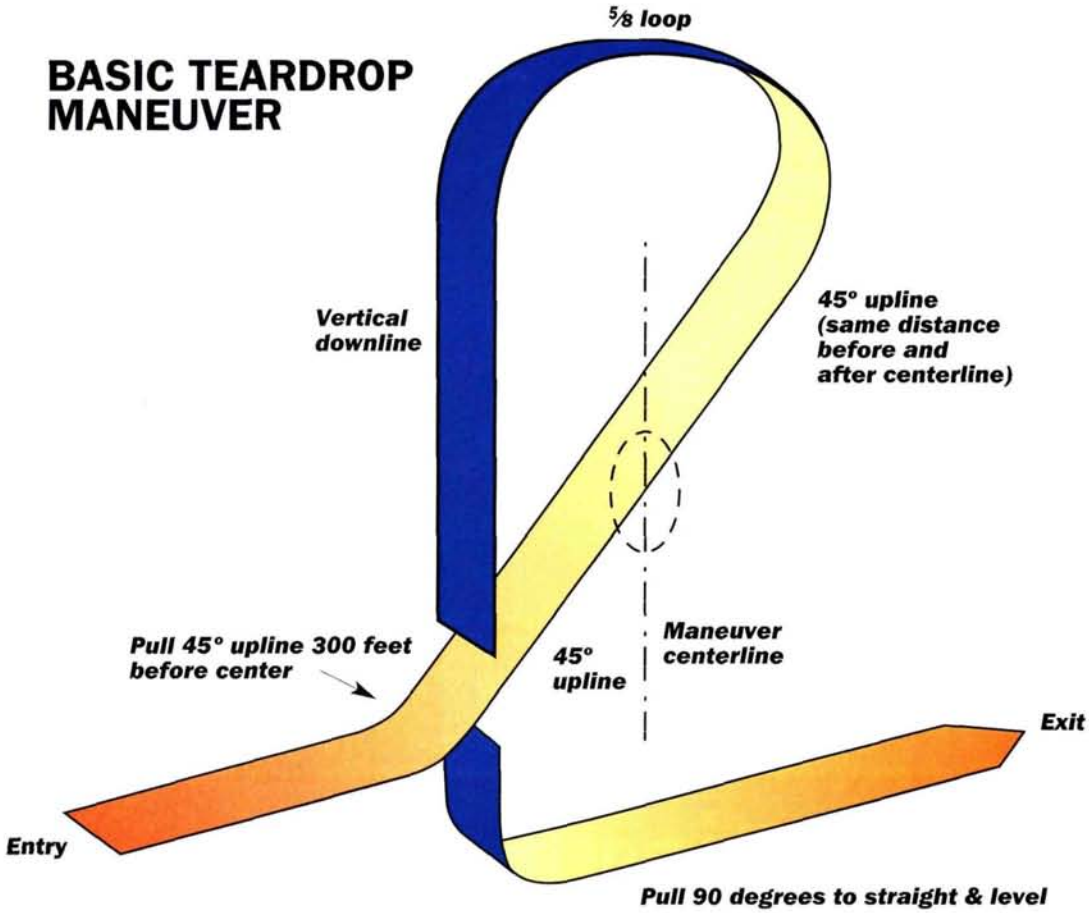
by Dan Wolanski

The Teardrop is an aerobatic maneuver that comprises a 45-degree segment connected to a ⅝ loop. It looks very similar to a half Cuban-8 standing on its end (rotated 90 degrees). The similarities, however, between a half Cuban and the Teardrop end quickly when you attempt it. You will find that this is a very power-hungry maneuver that takes a lot of practice to make it look good.

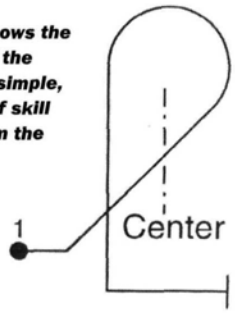
The Teardrop first appears in the International Miniature Aerobatic Club (IMAC) advanced class, and it can be flown as a simple geometric maneuver or in combination with snaps, spins and rolls to increase its difficulty. The maneuver can also be used as a beautiful center maneuver or a turnaround maneuver at the end of the aerobatic box. Each scenario requires quite a bit of practice, precision and diligence to fly, so let's begin with the basic geometry.

FLYING THE TEARDROP AT CENTER

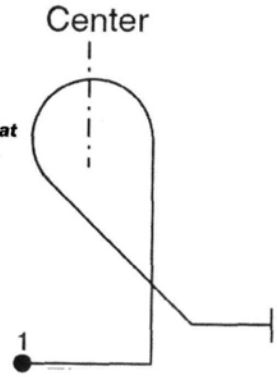
Figure 1 is the basic Aresti diagram for the Teardrop. To fly this maneuver at the center of the box, you must start the 45-degree segment before the centerline of the aerobatic box. The 45-degree portion of the maneuver should be



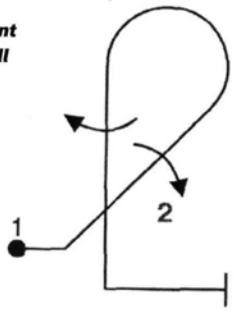
Aresti figure 1
This illustration shows the basic segments of the Teardrop; it looks simple, but it takes a lot of skill to properly perform the maneuver.



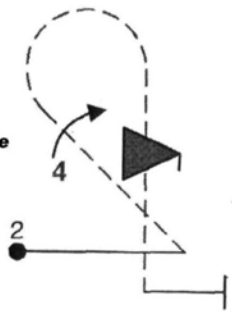
Aresti figure 2
The reverse Teardrop; note that the loop—not the 45-degree line—is centered.



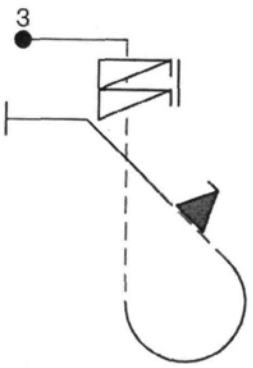
Aresti figure 3
Teardrop with 2-point roll and full roll. Pull to 45 degrees. Perform a 2-point roll on the 45. Pull to ⅝ inside loop. Perform full roll on downline. Exit upright.



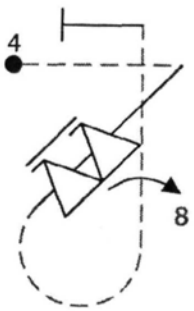
Aresti figure 4
Teardrop with 4-point roll and snap roll. Pull to 135 degrees. Perform a 4-point roll on inverted 45. Push to ⅝ loop. Perform one negative snap on downline. Exit upright.



Aresti figure 5
Teardrop with spins and ½ snap roll. From a high line, stall the aircraft and perform a 2-turn spin. Pull to ⅝ loop and perform a ½ negative snap on 45 upline. Exit upright.



Aresti figure 6
Teardrop with snap rolls and 8-point roll. From a high line, enter inverted. Pull 135 degrees to a 45-degree downline. Perform two positive consecutive snap rolls on the 45-degree downline. Push to ⅝ loop and perform a vertical 8-point roll. Push and exit positive.



centered. This means that the centerline should bisect the 45-degree line and all of the radius portions of the maneuver, including the loop, which must be equal. (I told you that this was more difficult than a half Cuban-8!)

Begin by flying your airplane 75 to 100 yards in front of you, parallel to the runway. After establishing straight and level flight, advance the throttle to full about 400 feet before the center of the box. At around 300 feet before you reach the center, pull the aircraft to a 45-degree upline with a radius that you will duplicate in the loop portion of the maneuver. Once you've established a 45-degree upline, begin counting how long it takes to cross the centerline. This will usually be in the 2- to 3-second range. Once you pass the centerline, count again using the same cadence. When you reach the same time, pull the ⅝ loop portion of the maneuver using the same radius as you used at the start of the maneuver. As you pass inverted, slowly throttle back to idle and draw a perfectly straight downline. Exit the maneuver using the same radius once again. (Insider tip: adjust the length of the 45-degree line and your loop radius so both come out perfectly centered. Try to be inverted as you cross back over the centerline during the loop. It is not required, but it looks nicer, and you'll score higher if you do.)

THE REVERSE TEARDROP AT CENTER

Figure 2 is a diagram of a reverse Teardrop, which uses a few different rules for centering. Most notably, the center of this maneuver is the loop portion—not the 45-degree line. To fly this maneuver at center, you need to fly past the aerobatic box centerline and then pull to a vertical upline. Using the same radius as you did at the start of the maneuver, pull the ⅝ loop. For perfect centering, you should be inverted as you pass the centerline. The 45-degree downline is now yours to control when you want to exit. You do not need to exit this maneuver at the same altitude as you entered. (Insider tip: make your exit at the same altitude; it will look nicer, and you'll probably score higher, even though you aren't supposed to.)

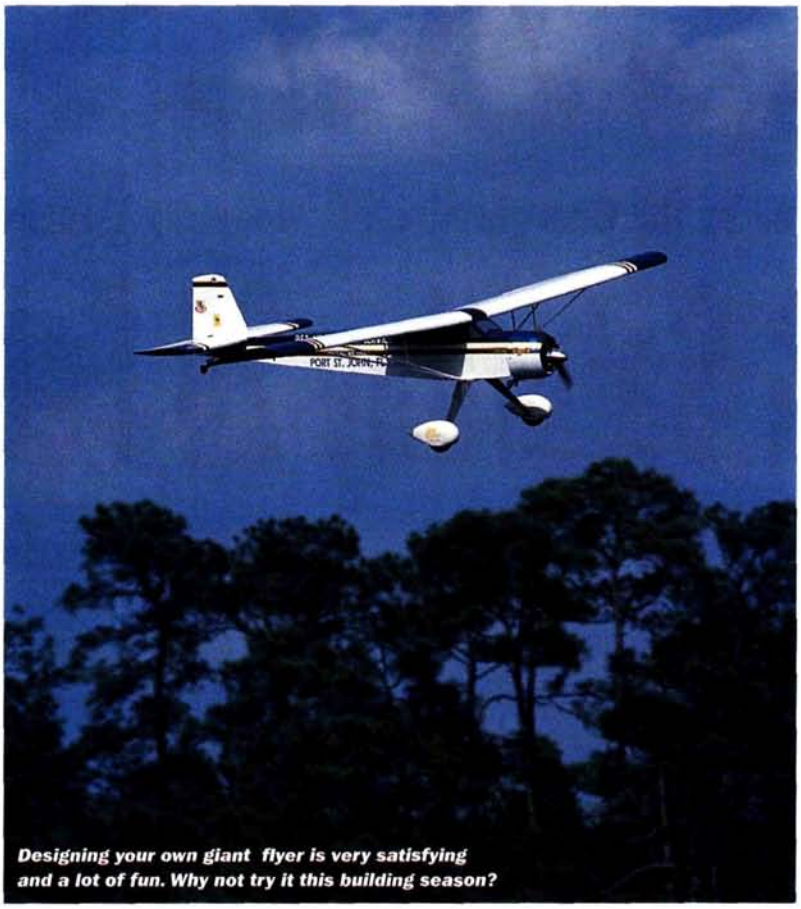
When you have tried the Teardrop at center, flying it as an end box maneuver (turnaround) now becomes much easier. Center is no longer graded, and the judging criteria switches to centering the elements on the up-and-down lines and maintaining constant radius. Now all you have to do is practice!

VARIATIONS

As you progress through the classes of IMAC, the Teardrop shows up with a few more tricks. It can be extremely difficult to perform when used with combinations of rolls, spins and snap rolls. Also, inverting the Teardrop puts a new twist on things for more advanced pilots. Use the flying criteria above, and once you've mastered the basic geometry, give these variations a try. Chances are, you will never get bored or shed a "tear" with this maneuver. For a complete list of IMAC rules, log on to www.mini-iac.com.

Designing big birds

Recently, a few flying buddies and I were sitting in front of a wood-burning stove talking about the weather and, of course, model airplanes. Colder outside temperatures signal the traditional Northeast modelers' migration back into our workshops, so we discussed ways to design a first-time, giant-size model. Ideas on airfoils, engine sizes and power-to-weight ratios were thrown around, but the most interesting idea we came up with was a basic guide that almost anyone could use to start the design process and to get the creative juices flowing. Sure, you could simply enlarge a proven model design until you have a giant version, but if you want to start with a blank sheet of paper, it will take a little more effort.



Designing your own giant flyer is very satisfying and a lot of fun. Why not try it this building season?

What better way to welcome the building season than with some design notes and illustrations to help you get started?

DESIGN 101

First, I didn't just pull these figures out of the air. Refer to Figure 1, and you'll see the basic dimensions for a well-balanced, constant-chord, high-wing monoplane. Hey! It's intended as a first-time endeavor, so let's keep it simple. I researched several basic model aerodynamic-design resources and settled on the information supplied by several model designers. Remember that these are just starting points and not forged-in-steel absolutes.

The diagram shows the basic wingspan, chord and tail-moment information needed to establish the foundation of your design. Engine size and airfoil choices can be determined later. The fun part is sketching in the shapes and details that you like after you've made a few simple calculations. You must draw two basic sketches before you can develop your own construction plan—the wing-plan view and the fuselage side view.

THE WING

A rectangular, constant-chord wing is the easiest to design and build because the ribs are identical and the airfoil shape is constant from root to tip. The mean aerodynamic chord (MAC) needed to determine the position of the balance point is also constant and requires no further calculation; the wing chord and the MAC are the same.

The aspect ratio (AR) is the relationship between the wingspan and the wing chord. The AR affects the model's induced drag, or the amount of drag caused by the wing when it develops lift. For a given wing area, the more you increase the AR, the lower its induced drag becomes. This is why gliders have such long and slender wings. To determine the AR, all you have to do is square the wingspan and divide that number by the wing area.

Because longer, slimmer wings are subjected to higher twisting and bending forces, you can't just make your wing panels as long as you want. Figure 1 shows an AR range of between 5 and 7. This gives a reasonably wide choice of wing planforms. Given a 90-inch wingspan as your starting point, an AR of 5 would give you an 18-inch chord and 1,620 square inches of area. An AR of 7, however, produces a 12.75-inch chord and an area of 1,170 square inches. Do you want a model that looks like a clipped-wing Cub (low AR) or one that looks like a Storch or a Pilatus Porter (high AR)?

Ailerons are shown with dimensions that are percentages of the semi-span area and wing chord. A strip aileron is shown the full span of the wing panel and with a width that's 15 percent of the wing chord. For a barn-door aileron, use 40 percent of the semi-span for the length and 25 percent of the wing chord for its width. Pretty easy!

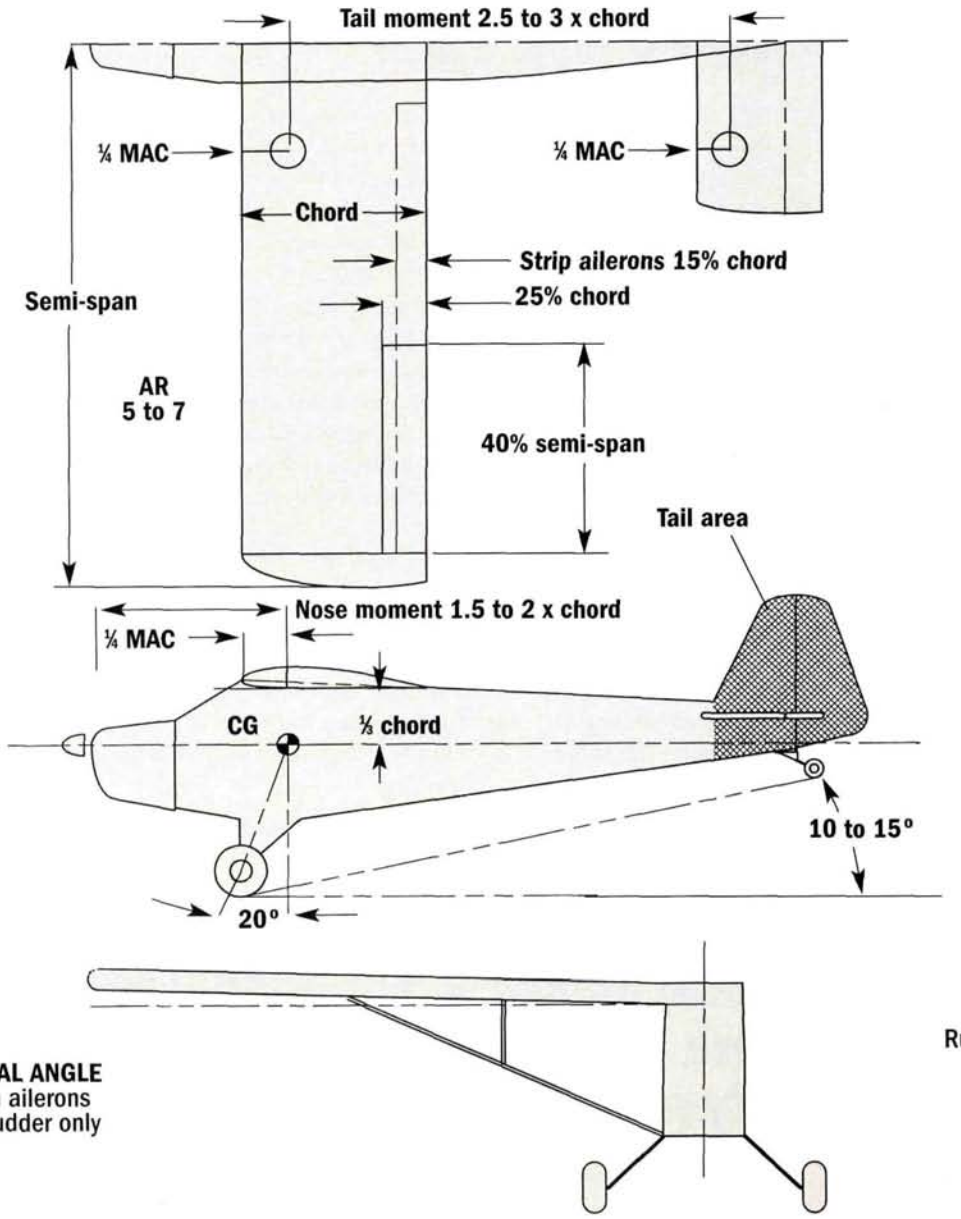
When it comes to airfoils, we could start an entirely new column on the subject. But for the sake of argument, there are three basic choices: a flat-bottom airfoil for a trainer, a semisymmetrical one for sport flyers and sport-scale airplanes and a fully symmetrical airfoil for aerobats (see Figure 2). For a first giant flyer, let's stick with a semisymmetrical one.

FUSELAGE AND TAILPLANE

Once you have established the chord length of your wing, you can determine the overall length of the fuselage and its various moments. Draw your airfoil on the plan, and mark its ¼ MAC

FIGURE 1. MODEL DESIGN PARAMETERS

NOTE: *illustration is not drawn to scale.*



HORIZONTAL TAIL AREA
18 to 22% of wing area

AR
3 to 5

ELEVATOR AREA
30 to 40% of total horizontal tail area

TAIL AREA
5% wing area for aileron
8% for rudder only.
Rudder should be 30 to 40% of total tail area.

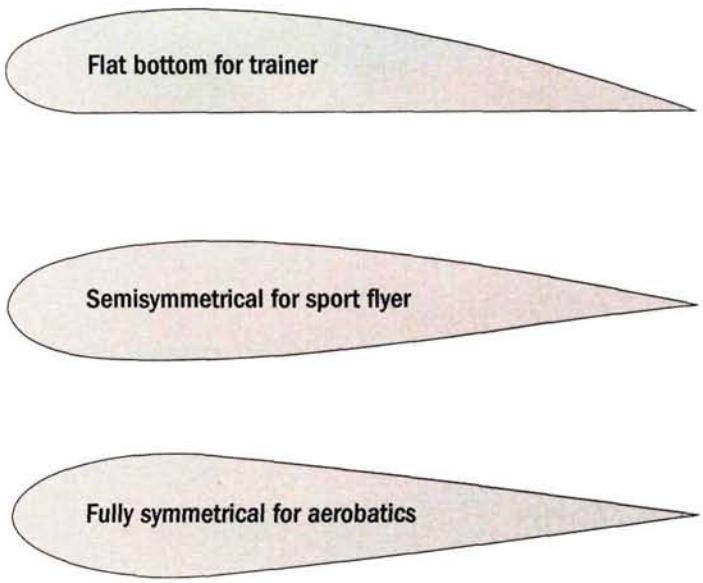
DIHEDRAL ANGLE
2° with ailerons
5° for rudder only

location, or balance point. The nose moment, or the distance of the spinner's backplate from the ¼ MAC, should be 1.5 to 2 times the chord. With a wing chord of 18 inches, the distance should be between 27 and 36 inches. The tail moment is the distance between the wing's ¼ MAC and the tail plane's ¼-MAC location; it should be between 2.5 and 3 times the wing chord. Again, with an 18-inch wing chord, the tail moment would be between 45 and 54 inches.

In the top view, the tailplane (horizontal stabilizer and elevator) is shown like a smaller wing with parallel leading and trailing edges. This is to simplify our diagram. Tapered surfaces can also be used, but you will have to calculate its MAC and its 25-percent location. The tailplane area should be between 18 and 22 percent of the wing's area, and its AR should be between 3 and 5. The elevator area should be approximately 35 percent of the total tailplane area.

The rest of the fuselage details are then developed around the thrust reference line location and the placement of the landing gear. A good place to start is to draw the reference line about ⅓ of the wing chord below the wing. Place your center of gravity (CG)

FIGURE 2. BASIC AIRFOIL DESIGNS



MORE FUJI FIRE!

The newest powerhouse from Fuji Engines—the BT-64A—uses the same engine mount as the popular BT-50SA. More displacement means more power, and the 63.1cc BT-64A is rated at almost 6hp! It has many of the same features as are found on other Fuji engines, including a chrome-plated cylinder sleeve, an automatic-timing-module (ATM) ignition and a large-volume muffler. Two other welcome features are the butterfly choke valve that replaces the slide-plate choke setup and a carb position that allows direct throttle-linkage setup without the use of a 90-degree bellcrank. The new BT-64A will be available at the end of 2002 for a street price of less than $450. Keep an eye open for this one; it's just the ticket for that 100-inch aerobat or warbird!

SPECIFICATIONS

ENGINE: Fuji BT-64A

DISTRIBUTED BY: Great Planes Model Distributors

DISPLACEMENT: 63.1cc (3.8ci)

PRACTICAL RPM RANGE: 1,300 to 7,200

OUTPUT: 5.7hp @ 9,000rpm

WEIGHT: 4.8 lb. (with muffler)

RECOMMENDED PROP: Bolly 22x12 carbon

on the reference line directly below the ¼ MAC. For simplicity, I show a tail-dragger, so the main gear axle should be at roughly 20 degrees to the CG and at a sufficient distance below the reference line to provide adequate propeller and ground clearance. The gear stance (distance between the main wheels) should be about ¼ of the total wingspan.

With all the basic parameters laid out, all you do is sketch in the rest of your design; and remember, these are good suggestions but not absolutes. Have fun, and let me know what you come up with. Write c/o *Model Airplane News*, or send email to gerryy@airage.com.

To learn more about model structures and design, check out Andy Lennon's book, "Basics of Model Aircraft Design." It's item no. 2023 in the RCStore.com section in the back of the magazine.

***Fuji;** distributed by Great Planes Model Distributors (800) 682-8948; greatplanes.com.*

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MAGAZINE BACK ISSUES: *Model Airplane News, RCM, FM.* Model and full-scale titles, 1930-1999. Send SASE for list: Carolyn Gierke, 1276 Ransom, Lancaster, NY 14086. [6/03]

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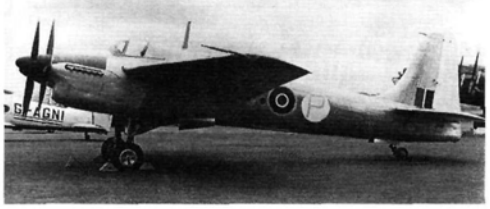
NAME THAT PLANE

Can you identify this aircraft?

SEND YOUR ANSWER to *Model Airplane News*, **Name that Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.

The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.



Our congratulations to Charles Stover of Ridgefield, CT, winner of December's "Name That Plane" contest. Charles was one of only a handful of readers who was able to successfully identify December 2002's mystery plane as the Short Sturgeon, a naval reconnaissance bomber specifically designed to operate from the Ark Royal and Hermes-class aircraft carriers. With the end of WW II came a significant decrease in the need for such aircraft, so the Sturgeon was converted to a high-performance, carrier-based target tug. Its primary duties included towing targets for ground-to-air firing practice, photographic marking of ground-to-air firing, target towing for air-to-air practice (day and night), "throw-off" target practice and radar calibration. The Sturgeon featured a strong, single-leg undercarriage and power-folding wings. Powered by two Merlin 140 engines driving constant-speed, feathering, six-blade contra propellers, the Sturgeon could reach speeds of nearly 400mph. ◀

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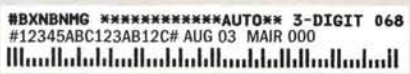

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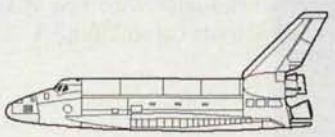

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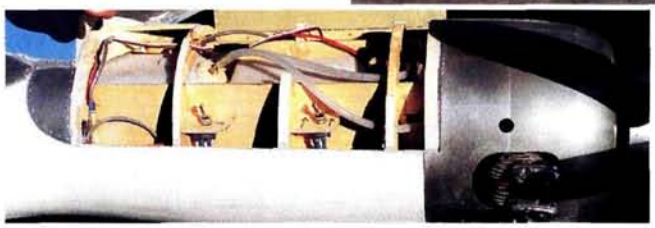
BY JERRY SMITH

B.B.'s gigantic Russian Bear bomber

B.B. Weber seems to have quite an affinity for 4-engine bombers; he has several B-17s in his hangar, promotes B-17 fly-ins and has even named his personal flying area "Bomber Field." But three years ago, B.B.'s fascination with these gigantic flyers took on a whole new dimension: that's when he began construction of his 1/10-scale Russian TU-95 "Bear" Intercontinental Nuclear Bomber.



Above and left: the engine nacelles contain the engines' fuel tanks and ignition sytems.

Built from a Don Smith plan, B.B.'s TU-95 has a wingspan of 21 feet, 6 inches and is 18 feet, 7 inches long. It certainly isn't something you could easily slip in the back of your van and take to the flying field! From the ground to the tip of the fin, the model measures 4 feet, 3 inches. The wing area of this giant is 4,636 square inches, and it has an all-up weight of 90 pounds, which means it has a wing loading of 45 ounces per square foot—not bad, given the model's size. B.B. built his TU-95 entirely from balsa, ply and fiberglass.

Four Saito 1.82ci 4-stroke engines power this TU-95, and each engine has its own electric starter and glow driver. Because the engine nacelles were a bit too small to house large fuel tanks, each nacelle contains two smaller tanks that nearly equal the size of a single large one. This is a neat trick to remember.

A model of this size requires special hardware that can't be purchased at the local hobby shop, so most of it had to be custom-made. Tru-Turn took care of the uniquely shaped spinners; the landing gear was custom-built by Robart; and air brakes and eight wheels came from Brookside Machine. The special hardware problem becomes monumental and costly on an airplane of this size.

Before each flight, B.B. ensures that his bomber is airworthy. He double-checks the status of all 16 batteries, makes sure the retracts are operating properly, performs a visual inspection of all the control surfaces and pushrods and, of course, fills the fuel tanks.

It requires both a pilot and a copilot to fly the TU-95. Using two Futaba transmitters, the pilot controls the four flight functions and the flaps while the copilot operates the electric starters, the retracts and the retract-wheel doors. It's a somewhat cumbersome system, but it works. The TU-95 also requires three receivers: two for the flight control with redundancy and the third for the copilot.

So, what's it like to fly the TU-95? According to B.B., it flies steady with no bad habits and is very docile. As you would expect, it isn't terribly responsive, but it is extremely impressive, both on the ground and in the air. Three years in the making, this model is a tribute to the ambition and diligence of B.B. Weber—the dedicated modeler who saw it through to its completion.

The Bear dominates the pit area.